21 DECEMBER 1950

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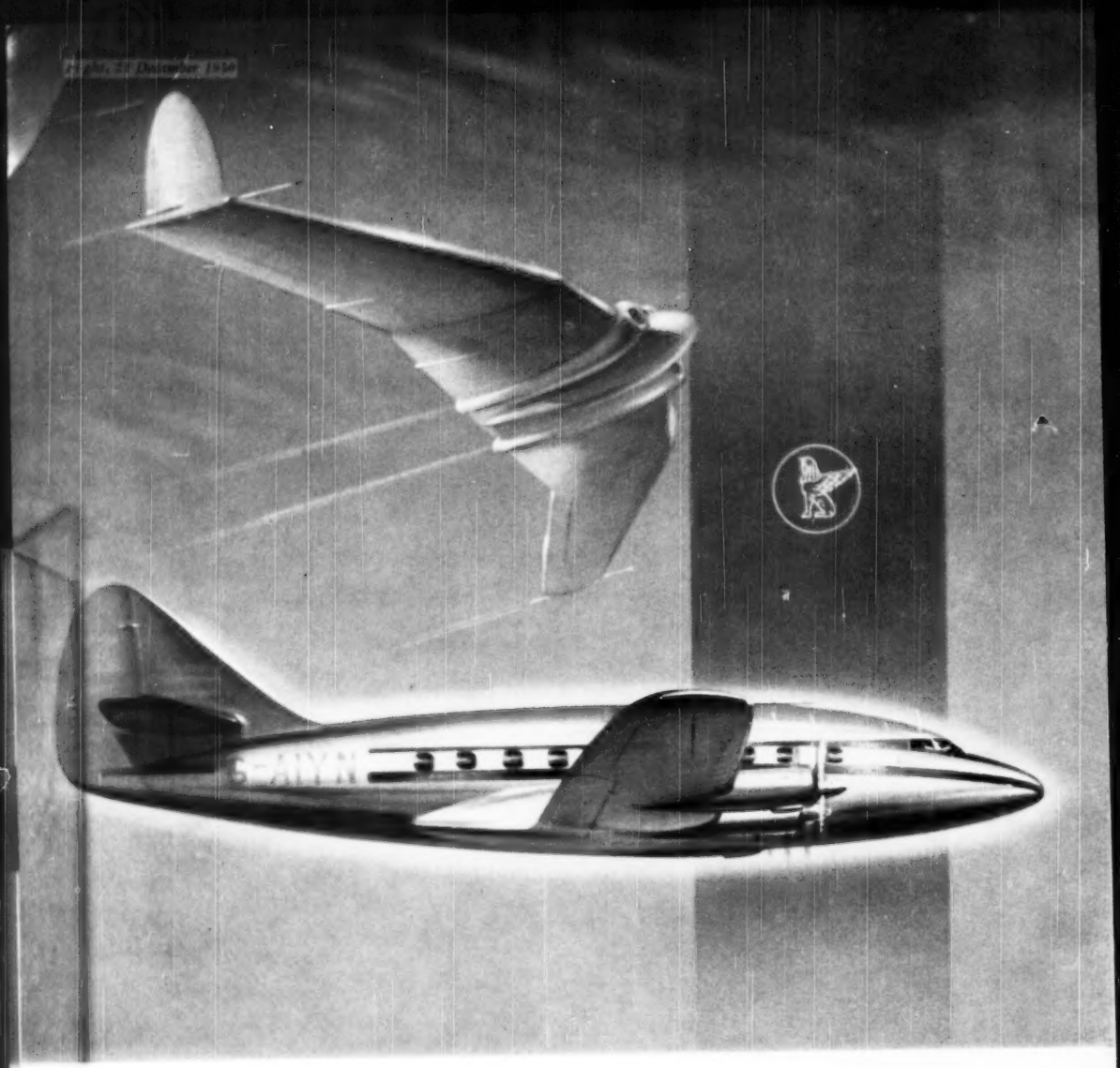

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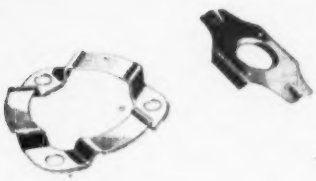
OGENT

The Sydney Harbour Bridge, opened in 1932, has a total length of 3,770 feet and carries four railway tracks, a roadway fifty-seven feet wide and two footways. The bridge was designed, constructed and completed by a British firm.



Terry's research in the field of springs and presswork over the last ninety-five years has, on many occasions, been the means of bridging the gap between invention and production. Where difficulties had arisen Terry's produced the springs or presswork parts which solved the problem. Terry's research goes on and is *always* at your service.

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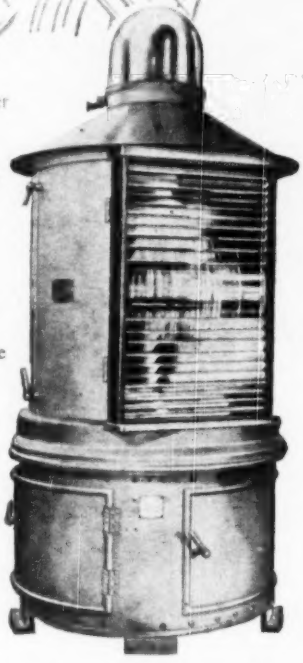
The sooner a pilot spots the location beacon that marks his destination the easier and safer his landing. The range of visibility depends on three things . . . intensity of beam, duration of flash, angle of view. The Chance 'Square Beam' Airport Location Beacon generates a greater intensity of beam, gives a constant duration of flash to the uppermost limits of the angle of view and sends a powerful light skywards; it exceeds in every respect the standards laid down by the International Civil Air Organisation. The 'Square Beam' provides a foretaste (and no ordinary one) of the many improvements Chance Brothers mean to give to navigational lighting in the future. An illustrated folder containing full details will be forwarded on request.



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AT 114

Your number's nearly up, Dr. Mach!

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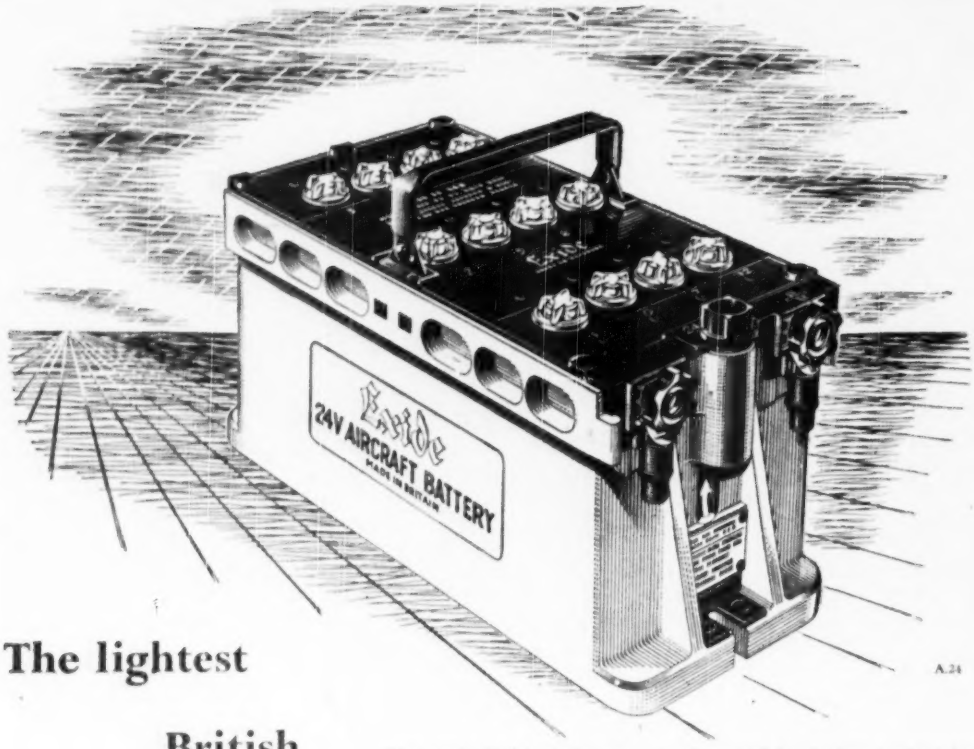

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The Directors and members of Folland Aircraft Limited extend to their many friends in the Ministry of Supply, Transport Services, the Royal Air Force and throughout Industry, their best wishes for Christmas and may the New Year be a prosperous and peaceful one.

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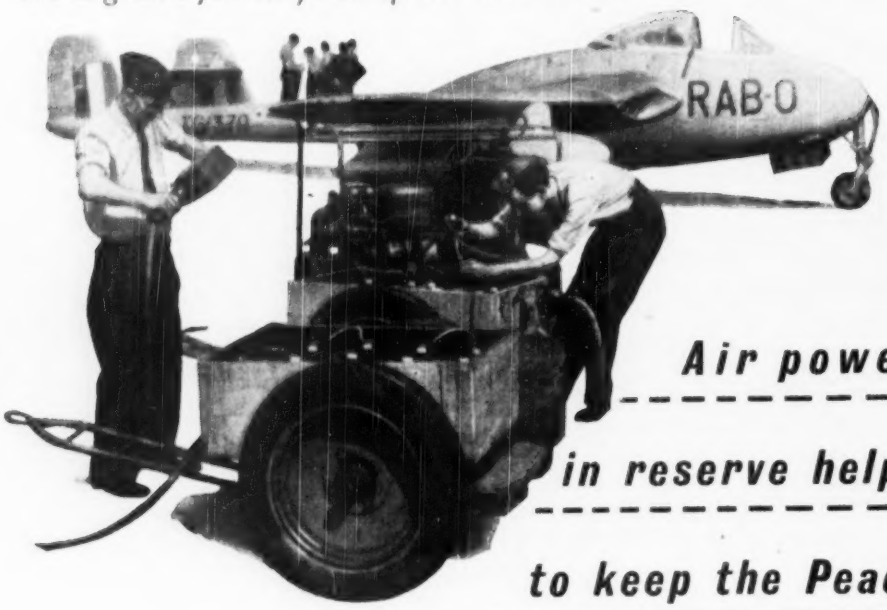
Do a grand job in your spare time . . .



Air power in reserve helps to keep the Peace

Air power is Britain's first line of defence. An efficient, highly trained reserve force, proud of its ability to back up the regular R.A.F., is the best deterrent to would-be aggressors. Men and women who believe that our strength in the air ensures peace are needed now to help maintain the proud status of the R.A.F. Auxiliaries and Reserves as the finest spare-time air force in the world.

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ROYAL AUXILIARY AIR FORCE

Flying squadrons (fighter and air observation post) (men), light ack-ack Regiment squadrons (men) and Fighter Control Radar Units (men and women) which train as *self-contained* city or county units.

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Please send details (pay, allowances, uniform, etc.) of R.A.F. Auxiliaries and Reserves. If ex-R.A.F. or ex-W.R.A.F. please give rank, trade and No.

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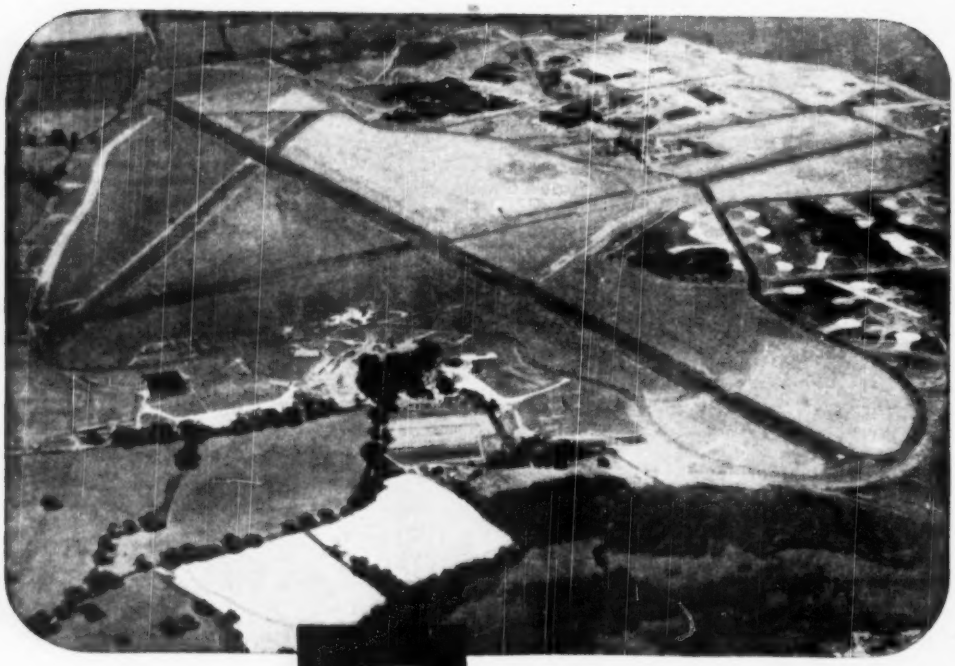

7

*Recognize this Airfield? It's No. 7 in this series of puzzle photographs. You'll find the answer below on the right**

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FROM THE HEART OF THE JUNGLE

WOUNDED RESCUED BY HELICOPTER

AMBULANCE SERVICE IN MALAYAN JUNGLE

FROM OUR AERONAUTICAL CORRESPONDENT

KUALA LUMPUR, Nov. 30

A R.A.F. helicopter was to-day used to evacuate a Chinese woman bandit, believed to be the wife of a Communist company commander, from the Malayan jungle.

The woman, who was suffering from the effects of starvation, was found 10 miles from the Siam border. Important documents and photographs were found on her. It was decided to try to get her to hospital and a casualty evacuation helicopter left Changi, near Singapore, to make the 450-mile flight to the place where the woman lay. Two pilots took turns at the controls, and, after landing to refuel at various airfields, the helicopter made a difficult descent in the jungle to pick the woman up from the sandy bank of a river. She should reach hospital to-morrow.

In hazardous flying conditions for single-engined machines these helicopter pilots are doing magnificent work, and the knowledge that casualties can be carried direct from the heart of the jungle to hospital is having a good effect on the morale of the troops. Since three Westland Sikorsky helicopters started functioning in June, 18 wounded men have been picked from the jungle and flown to hospital. Without air help most of them would have died. An officer wounded a few days ago was on the operating table in less than an hour. Two helicopter pilots flew for more than 13 hours to take a badly wounded private to a base hospital.

Extract from "The Times," December 1st issue

WESTLAND

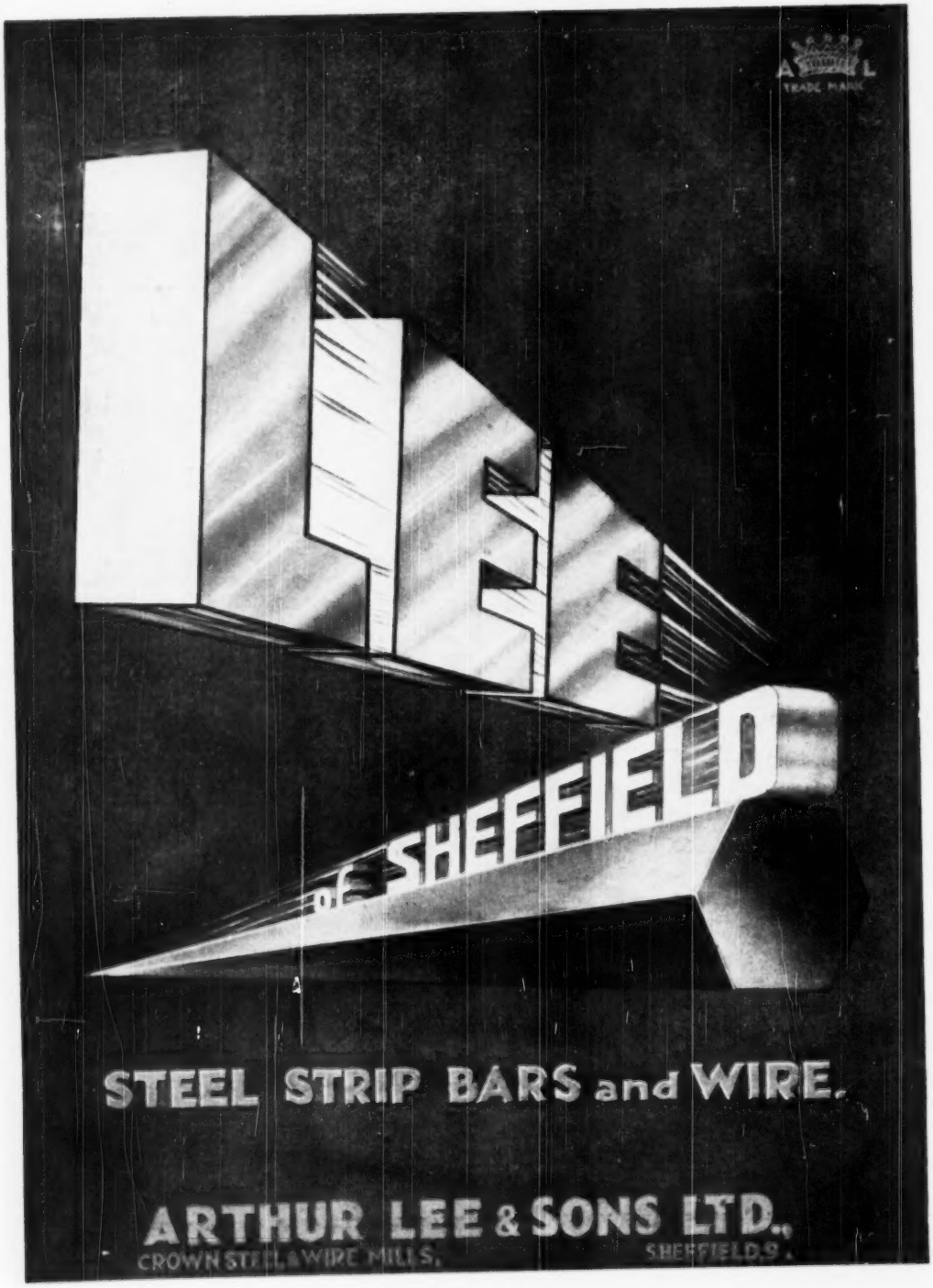
S·51

HELICOPTER

MANUFACTURED AT EUROPE'S LARGEST HELICOPTER FACTORY

by

WESTLAND AIRCRAFT LIMITED YEOVIL ENGLAND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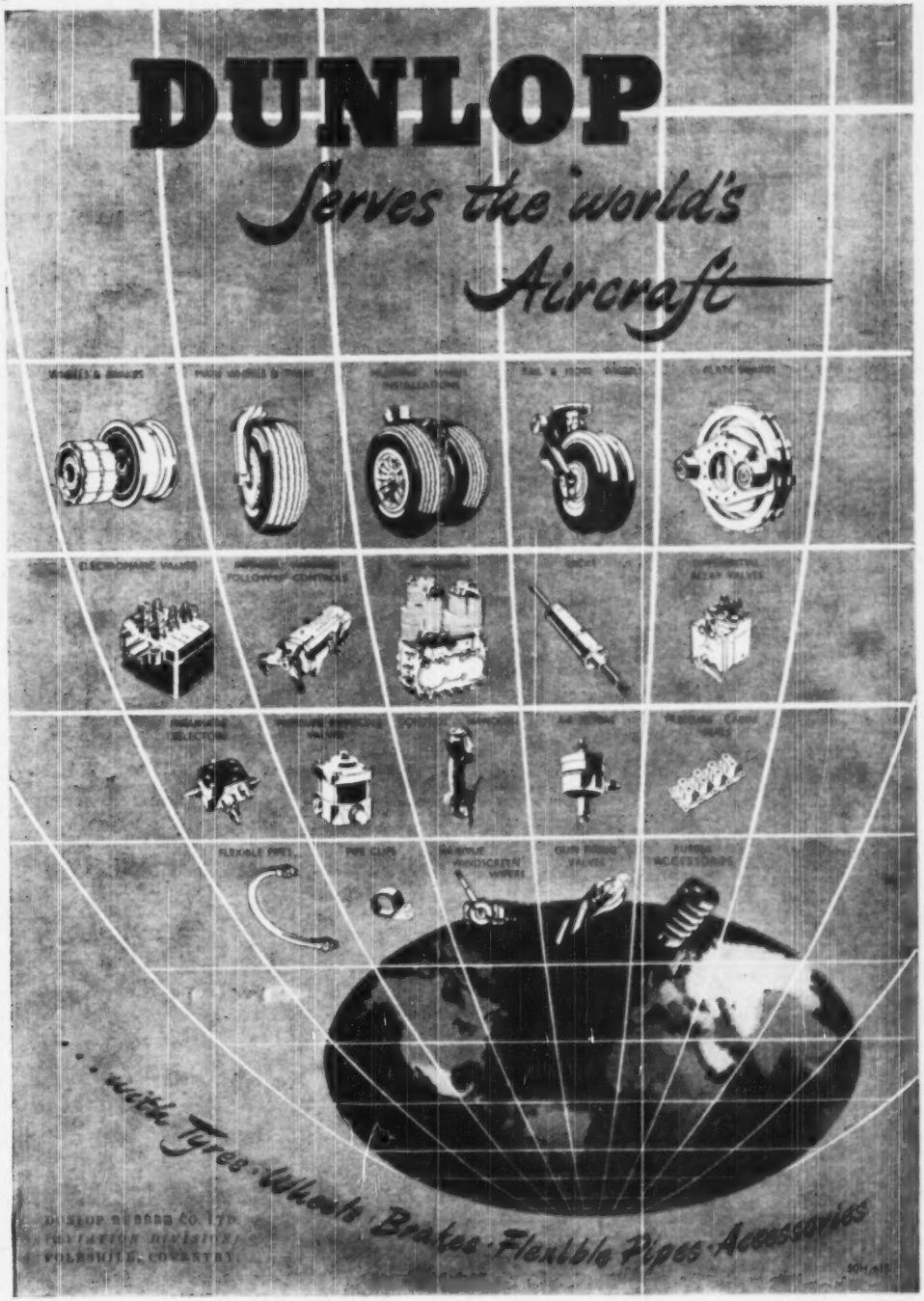
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a Prosperous New Year
to all our friends
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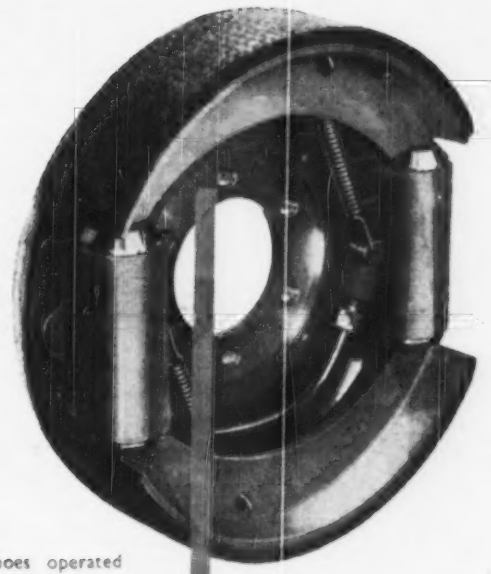
THE HYDRA-STATIC TWO-LEADING SHOE AIRCRAFT BRAKE



THIS brake consists of two self-aligning shoes operated by two wheel cylinders spaced diametrically opposite. Each wheel cylinder has two pistons of a different form : one having a slot at right angles to the axis of the bore, which operates the shoe when the brake is used in forward rotation and the other with the slot inclined at an angle to the bore which forms the abutment for the other shoe in similar condition. This inclined slot has a predetermined angle which allows the shoe to align itself accurately to the drum as well as forming the abutment. The total shoe reaction is transmitted via a shoulder on the piston to the cylinder body. By this arrangement, two-leading shoe operation is obtained in either direction, and greater power for a given input and greater stability is obtained.

TYPICAL FIGURES

5⅞" x 1½"	Approximate maximum dynamic torque 2,950 lbs. inches, at 60 lbs. per sq. inch lining drag. Two ⅝" diameter cylinders.
7" x 1½"	Approximate maximum dynamic torque 4,200 lbs. inches, at 60 lbs. per sq. inch lining drag. Two ¾" diameter cylinders.

Master cylinder for use with the above brakes is a ⅝" diameter x 1½" stroke design.

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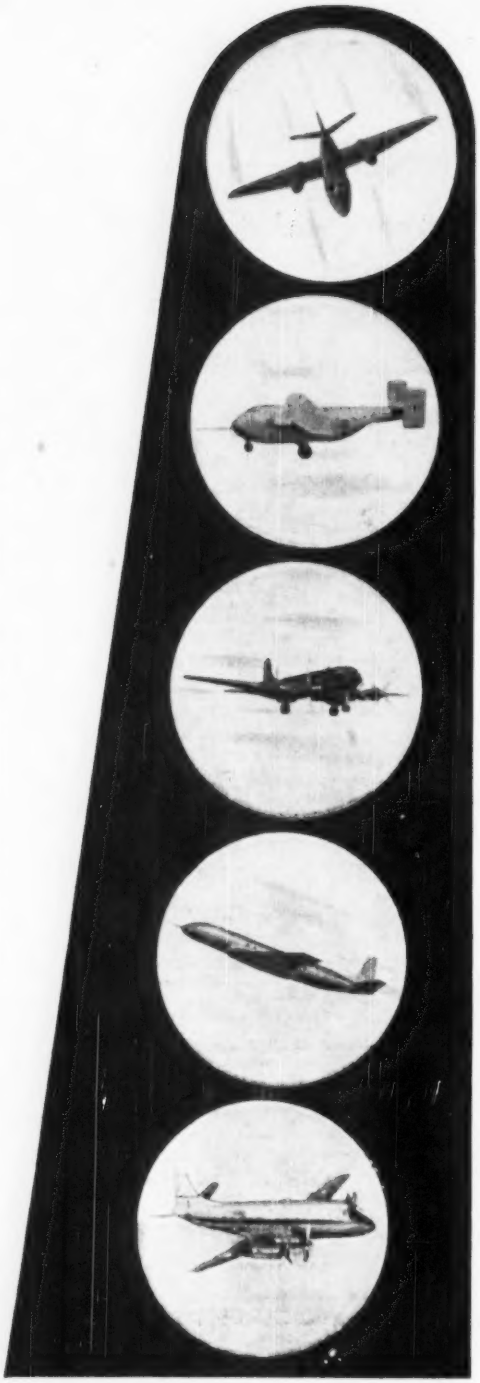

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CHRISTMAS 1950

In extending the compliments of the season to all members of the aircraft industry, may we join them in ensuring that their passengers have a comfortable New Year.

The conversion to Marshall cabin superchargers on the T.C.A.—Canadair fleet, and on an Argonaut aircraft o B.O.A.C. . . . . type test of Godfrey Cold Air Unit A.C.R.E. 8 and installation on production fighter aircraft . . . . . manufacture of the Godfrey Air Conditioning Truck . . . . . these have been notable contributions during 1950.

Sir George Godfrey & Partners Ltd.

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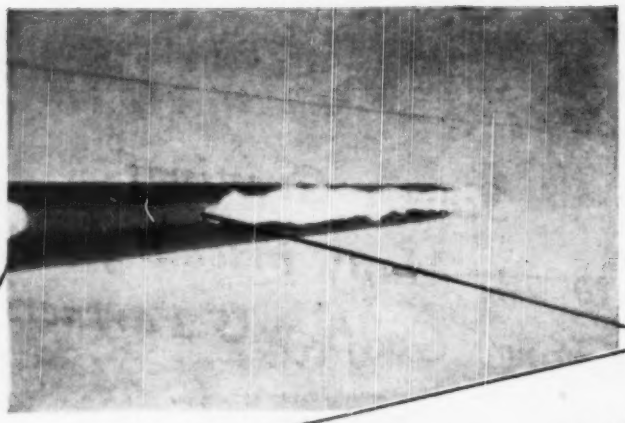

A three-foot section of the new T.K.S. Porosint Panel Distributor under test. Photo by courtesy of British European Airways.

Clear proof of the OUTSTANDING PERFORMANCE OF FLUID DE-ICING *shown by recent flight tests*

Flight tests last winter proved conclusively that the **new** T.K.S. POROSINT PANEL AEROFOIL DISTRIBUTOR is by far the most effective medium for the distribution of De-Icing Fluid.

Members of the Aircraft Industry and Ministries interested, are cordially invited to make application for a copy of the Official Report on these flight tests.

The improvements obtained by the new T.K.S. Porosint Panel Distributor may be summed up as follows:

1 **100% fluid exuding surface** within the area of water catch resulting in complete prevention of ice adhesion.

2 **Smooth continuity of surface**—eliminating not only all ice-keying fixtures but also any possible drag effect.

3 **Overall reduction of weight.**

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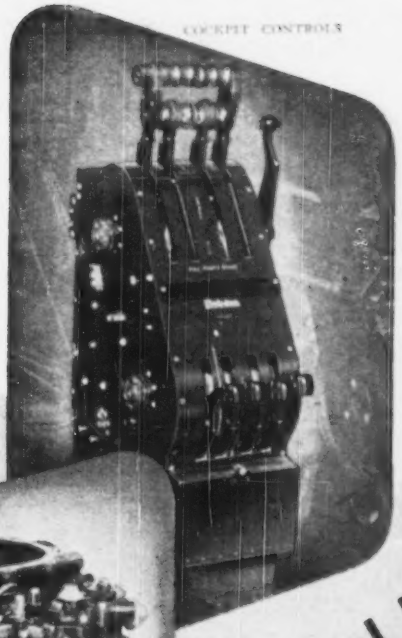
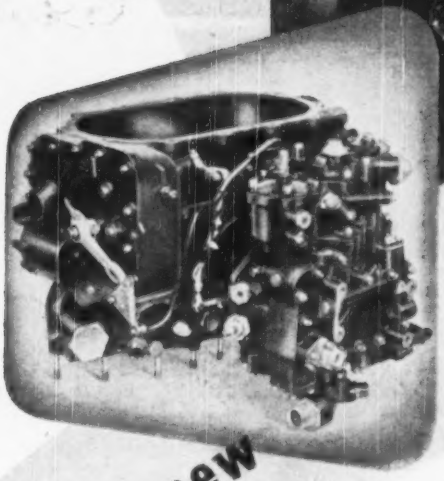


COCKPIT CONTROLS



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Control of engine power and r.p.m. is also provided by dual HOBSON Cockpit Controls. These latter units allow for the additional control of the braking propellers through aft movement of the pilot's throttle levers from the fully-closed positions, and automatically safeguard against engine stall during propeller reversal, engine overspeed during the propeller zero pitch range, and swing of aircraft when applying propeller braking. The Blackburn & General Aircraft Company is yet another leading manufacturer to rely on HOBSON experience, knowledge and traditions of quality.

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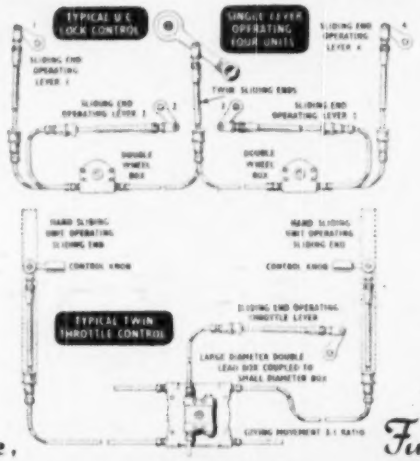

Teleflex systems allow the operation of engine controls and auxiliaries, propeller governors, fuel cocks, hydraulic valves, undercarriages and flaps, etc., to be effected from the cockpit.

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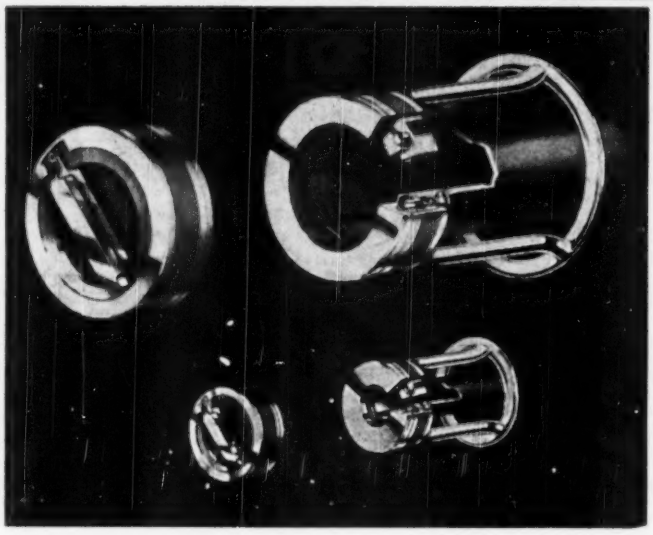

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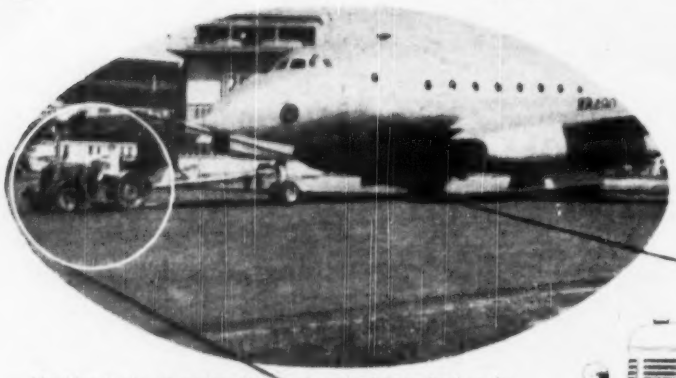

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Photograph shows a Taskmaster handling the new Avro Ashton at the S.B.A.C. Display, Farnborough, 1950.

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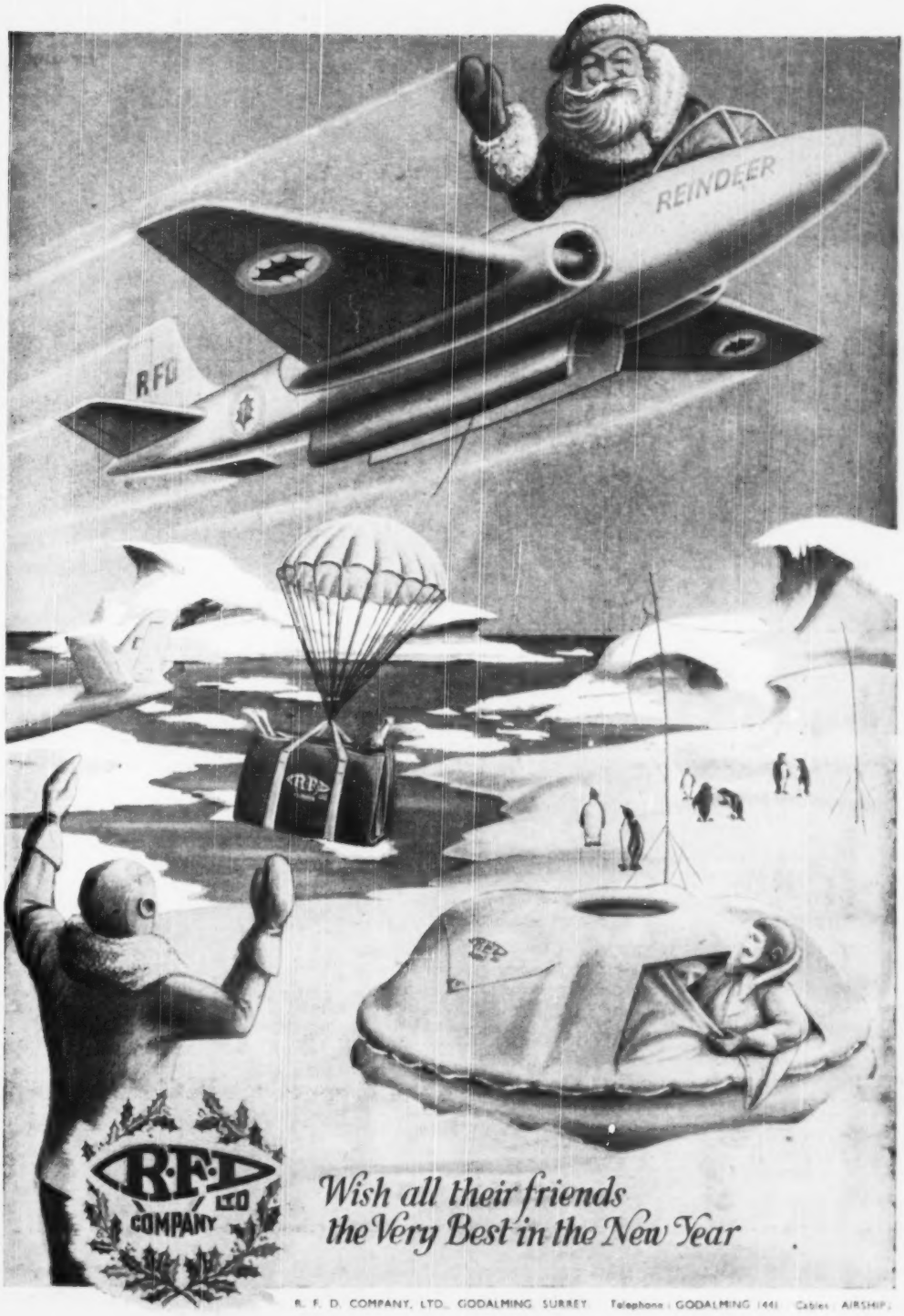

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1950

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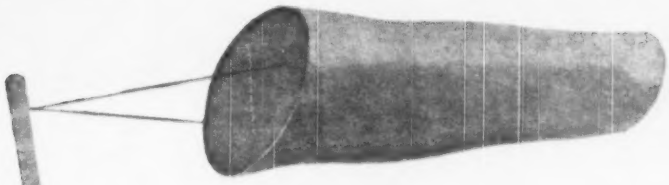

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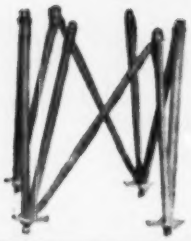

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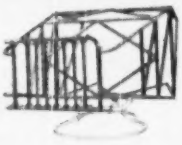

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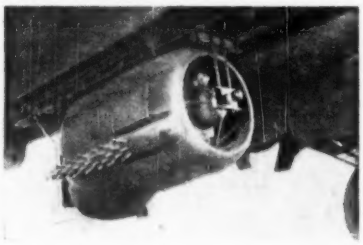

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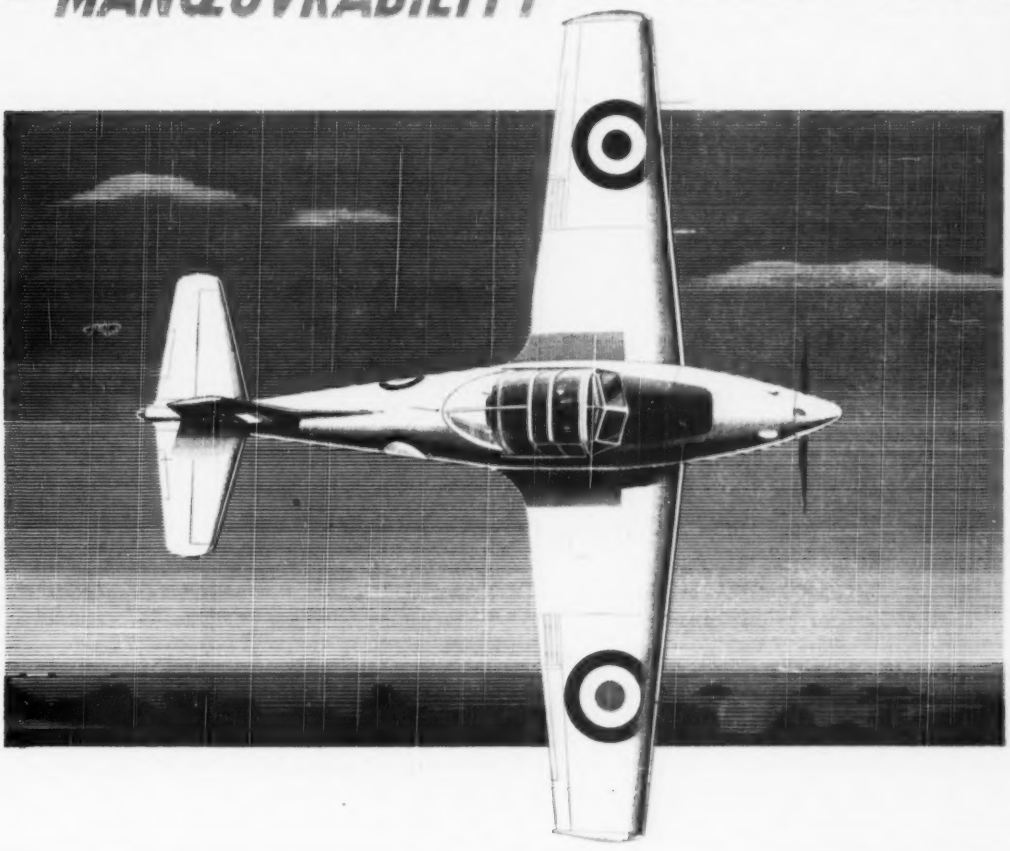

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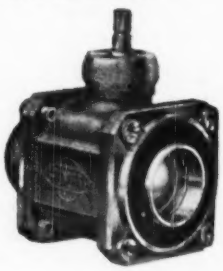

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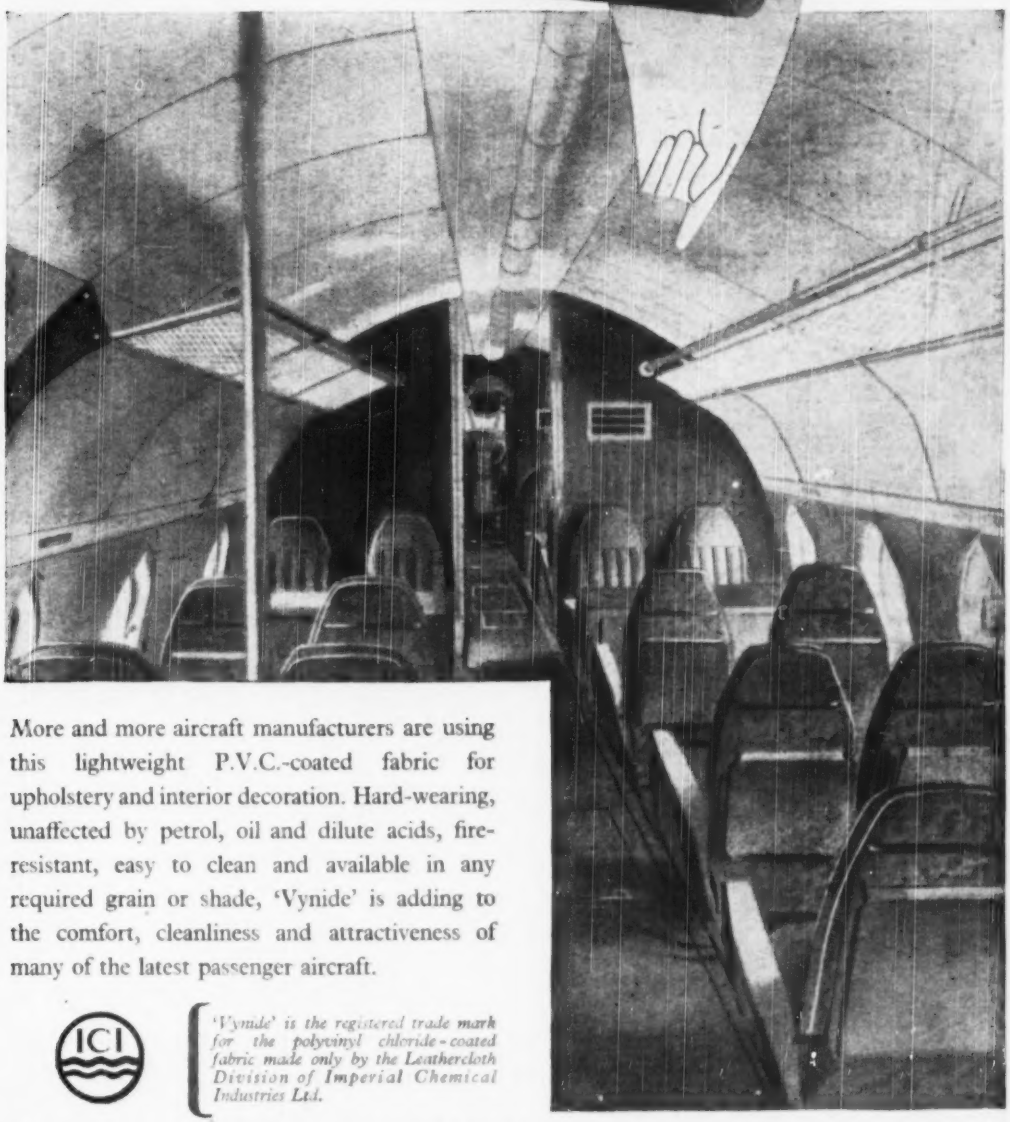

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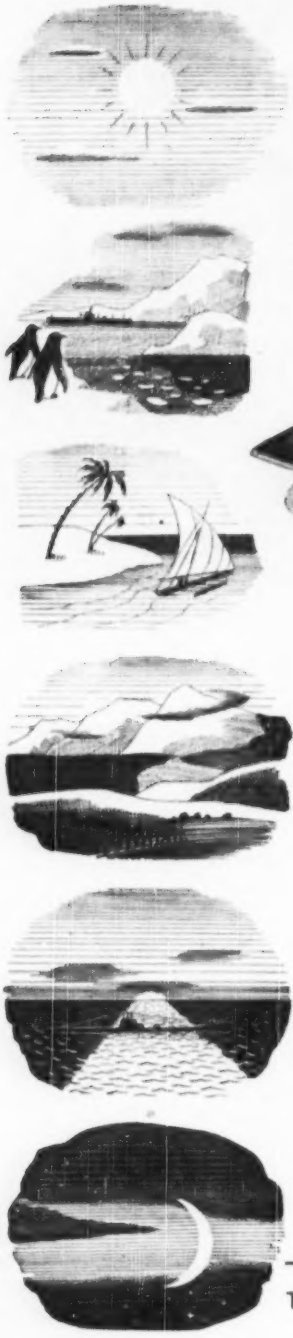

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Intermission . . .

PEACE on earth; goodwill towards men. . . . These simple phrases will be sung or spoken a million times during the next few days, for they *are* the spirit of Christmas in the Christian world and an expression of all our hopes for the New Year too. Although the thought of them brings comfort, there are few whose minds will not also dwell from time to time upon the sobering state of international relations.

At this season in the past *Flight* has usually presented issues largely devoted to the lighter moments of flying and aircraft construction; the present enlarged Christmas number is, perhaps, suited to the mood of the times, combining as it does some seasonable light reading and a serious assessment of the past year's harvest of aircraft.

The country will pass into the New Year and the second half of the twentieth century with high hopes that good will, good sense and restraint will prevail in international affairs. Until we and all friendly nations can again feel secure, however, we must sacrifice many of the desirable things of life in order to prepare to defend, if need be, those which to our way of thinking are as valuable as life itself.

Inevitably, 1951 will be an extremely active year for the aircraft industry. Let us at least hope that what is learned from the great expenditure of effort and money on military preparations will eventually be applied to the peaceful development of air commerce and the sport of flying.

A Backward Glance

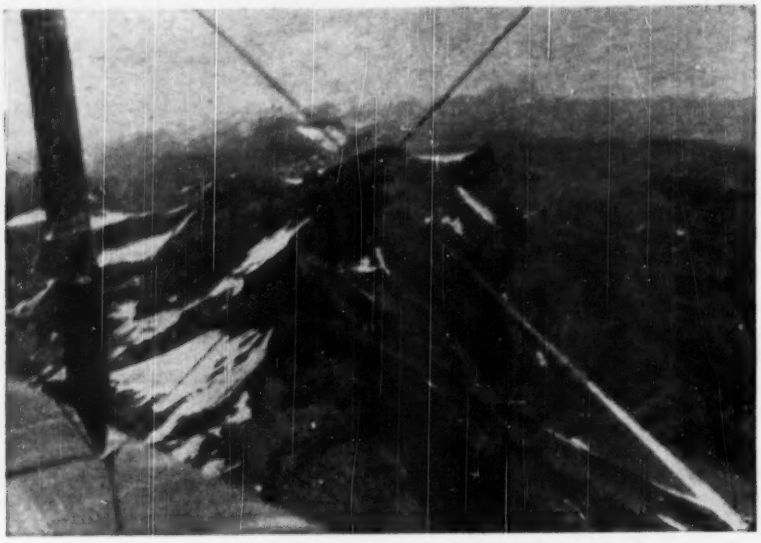
AT this time it seems wise and rewarding to glance back, as it were, over one's shoulder, at the year now all but spent. Though much of what lies behind is veiled in national security, some milestones, in the form of new aircraft, stand out sharp and clear. They confirm that the general direction, if not the rate, of our progress has been satisfactory. Certainly the review of "1950" aircraft on pages 583-596 of this issue affords little reason for reproach, though on the military side our continued lack of large jet bombers and fighters of certain classes is only too apparent. But some of our most glaring shortcomings are explained by the necessity of apportioning available resources between future requirements, implicit now in research and prototype-construction, and present demands for proven types in sufficient numbers.

We are left hoping that weighty military decisions taken in recent months will not prove to have been too late, nor the scale of our defence effort too unrealistic. There is real comfort in the knowledge that two or more research aircraft of delta form already exist in Great Britain, for so far as is known neither America nor Russia can match this particular achievement in a vital field. Most gratifying, too, are the technical advances discerned in the Commonwealth. With the CF-100 fighter Canada makes an invaluable contribution to Imperial defence, while Australia assumes heavy responsibilities in guided-missile development.

Whatever the impact of future events on the development of our civil aircraft, we can at least take pride in the bold constructional policy which brought forth the fine transport machines now almost ready for service. That no totally new types have come into being this year is no reason for regret; far from it, for the maximum available effort has thus been directed to the perfection of types which, though already a year or two old, are still in the very forefront of technical progress.

THE Editor and Staff of "Flight" extend to readers at Home and Overseas all Good Wishes for Christmas and a Happy and Peaceful New Year.

THE MOUNTAIN and the MOTH



". . . and, with a slight kick of port rudder, taking a picture of the Grand Muveran's summit."

Round the Matterhorn in a "Tiger" . . . . . By A. B. GOLAY

Mountaineering on 130 h.p. may not be every pilot's idea of a joy-ride, but such adventuring undeniably provides material for a good story—especially when it is recalled in the picturesque style of the present contribution. The author, Swiss by birth, learned to fly in the Civil Air Guard before the war, had a spell in the A.T.A., and was thereafter on technical work. Flights of this kind have, of course, been made before: those who read "Flight" in pre-war days may recall articles by the veteran private pilot Douglas Fawcett, who regularly explored the Alps in a Hornet Moth and other types of light aircraft.

THOUGH I had been flying quite extensively over other parts of the globe, the Swiss Alps with their granite masses covered by their eternal white cape had always been at the zenith of my winged ambition—especially, very especially, that proud needle named Matterhorn. Many had climbed it, some had already flown near it with powerful engines in front of them; but I made up my mind to fly over it in that toy, that foolproof kite, backbone of the English flying clubs—a Tiger Moth.

For months in advance I was thrilled at the anticipation of the trip, which no doubt would give me one of the greatest kicks in my life. I knew there was a certain amount of risk. A B.E.A. Dakota captain had told me they had definite instructions to keep away from these high peaks and that, if briefed to cross such areas, they had to carry all the necessary paraphernalia of oxygen-breathing apparatus.

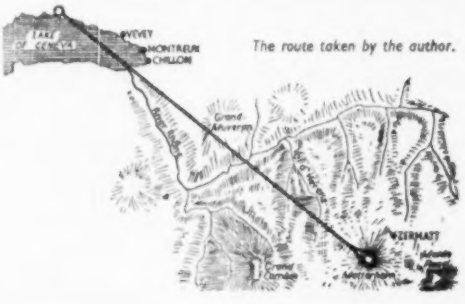
I also knew how draughty a Tiger Moth's cockpit always is, and that there was no possibility of adding to the weight by oxygen bottles; nor could my warm flying clothing be reduced.

You can now picture me arriving at Northolt on the night of July 8th, 1950, and dumping my car in the line of the parked vehicles awaiting their respective owners' return from some Continental trip. Loaded with my R.A.F. flying boots, lined flying coat and gloves, and with my telephone-fitted helmet hanging at the end of the communication tubes, I felt a rather goat-like creature in the bluish electric lights of the airport.

Though it has nothing to do with the main story of my trip, I must say that a night airline crossing to the Continent at an average of 9,000ft in a fairly clear atmosphere is a very wonderful experience, especially for passengers used to daylight travelling.

Thanks to a little tactful string-pulling a member of the Viking's crew reserved me a seat by dumping my heavy boots near the first window forward, port side, so that I could amuse myself by identifying the scenery passing under my eyes between the roaring engine and the fuselage.

Customs and embarkation formalities were soon over and, as happy as an owl fluttering round a familiar hunting ground, I made my way—not too quickly with my heavy equipment—to what was going to be an enjoyable two and a half hours' trip under a blue-black sky with stars and later, a modest half-moon looking over it all. Punctually at 2400 hours the pilot opened up, and in a few minutes, flying over the metropolis at 2,000ft, I was able to get my pocket compass to work and my air map open on the table; I called for the necessary information from the navigator so that I could follow and check our progress along the night



The route taken by the author.

track of the aircraft. Without difficulty I identified all the main roads and districts we flew over: Hammersmith, Marble Arch, the Mall, Piccadilly, the Thames, and many well-known bridges; then the London Docks and Southend, at which point we banked sharply to starboard and headed south (140 deg), leaving Margate right on our tail.

Travelling at 208 m.p.h. over the Channel, we soon found the lighthouse near Le Touquet greeting us from the Continent. I will not relate here all the fun I had in identifying from a fairly high altitude the many French towns as their hundreds of lights came into view before disappearing under the wing. I found identification much easier when cities saddled rivers, with the bridges to help; Dijon was the most striking example. I was so thrilled by this comfortable night travelling that my advice to readers is to travel likewise—and I believe that B.E.A. are now serving better suppers than the one they gave me.

In a matter of minutes from Dijon we were over the Jura hills, dominating the Swiss plain, with the lake of Geneva down below, the Savoy Alps in the background and the majestic Mont Blanc, with its Napoleonic triangular hat, greeting us faintly in the first light creeping in from the east.

Coming in to land at Geneva Airport is always a spectacular performance when one realizes that it has to take place immediately after the aircraft almost brushes the Jura tops; our pilot nosed down at 30 deg and in two wide circles, the last one right over the French Department of Savoy and the "little lake," making the final approach from the east end of the "two-way only" landing strip; it seemed

to draw us to earth as we made the final approach at roof-top height across the proud city of Calvin.

There was nothing particularly pleasant about disembarking into the Customs inquisition at 0320 hours, or waiting for the coach—having broken down, we were politely informed, it was now on its way to us.

On July 13th I rose fairly early, though hardly early enough for the programme of the day . . . the Swiss beds are so comfortable that even with a musical alarm clock it is a painful performance to kick the eiderdown away. The sun was up before me, in a pale blue sky with little wind to disturb it for quite a while. The mountains across the lake had the desired grey steel colour, promising good visual contact with the giants high up there. Everything so far, so good!

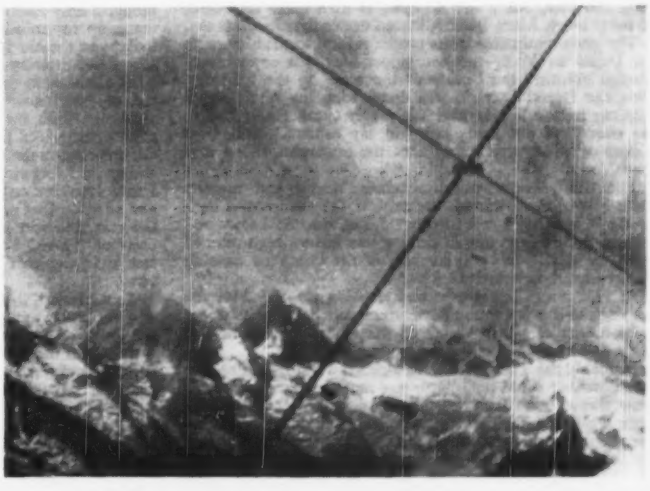
A few quick words by telephone with the airfield chief pilot at 0930 hours confirmed all last-minute preparations —filling up with fuel and oil, etc.—were well under way. The expectation of what was to come made me appreciate the Continental breakfast plus a few extras for physical ballast to ensure that my own system functioned as well as I expected that of the aircraft to do.

I had a great reception at the Lausanne Flying Club—at which, incidentally, every flying member has first to make a deposit of some £42 for as long as his licence is valid. The system of insurance, too, may be rather a liability for pilots, for in case of a total write-off of a light aircraft they have to pay £180. At the current rate of exchange I was charged £5 per hour flying time—and as I was likely to be flying all the time it would be the basic rate!

The sky-blue Tiger Moth I had chosen was waiting for me on the edge of the tarmac, already facing the 130 deg of my true track. A few telephone calls were put through by the chief instructor for weather reports on my route; a 35 m.p.h. wind was blowing at 13,000ft from the S.E. and practically a headwind all the way up. The general situation was fairly satisfactory and if there was no unexpected delay I could be in the air by 1045. I gave my flight plan to the chief pilot, who suggested that I should follow the safe Rhône Valley to within a couple of miles of Sion, making altitude all the time to 12,000ft a.s.l., and then aim for the Matterhorn. I pointed to my map and said, "Look at this true track starting from this airfield on direct course to the Matterhorn, 72 miles away. Unless you put down your 'veto,' this remains my route." He smiled and said "O.K."; and to keep in his good books I assured him that I would turn back should I see the red light.

All I had to do now was to make an inspection, for my own satisfaction, of the blue aircraft: fuel and oil tanks were full; the gas vents properly open; the petrol gauge was right; the ignition system seemed sound in every respect. A glance over the cooling system showed it to be O.K.; every cowling fastener was in place; all engine controls were functioning properly; the exhaust manifold must have been well looked after, for there was no trace of tiredness; the airscrew seemed above reproach; the fuselage was in a fair way of preservation; and there were no rags, tools or any obstructions near the cables. Finally, I jumped into the cockpit for a test of rudder elevators and ailerons; last, but not least, I checked the seat straps. Everything was in order.

Within a few minutes I had strapped myself securely in the cockpit and was running-up the engine for magneto and oil-pressure checks. Lausanne Airfield is still listed as "amateur" and is of rather primitive layout—running, like so many airfields in Switzerland, to two directions only, on account of the whole country's topographical arrangement. At 1050 hours I taxied up a steep slope, gave a last look round in all directions, turned into wind and opened up. The little Tiger Moth zoomed into the blue, climbing happily in a gentle left turn. I waved to my friends down below as I passed again over the airfield, with one eye on the instruments, my attention alternating to port and starboard as I put the nose on 140 deg. m. at a pre-arranged climbing speed of 75 m.p.h. Under my port wing was the Swiss plain, with three lakes glittering in the distance under the warm sun of a really beautiful summer's day. To starboard lay the blue lake Léman, its mirror-like surface only slightly ruffled here and there. The Dent d'Oche, on the



"Now the Grand Combin was dominating my track, and I paid tribute to her magnificence by another port kick to the rudder to put her picture in my camera."

THE MOUNTAIN and the MOTH . . .

south side of the lake, reflected her beauty into the peaceful water.

Vevey now went by, of Cornish Riviera appearance—an island surrounded by vineyards, made bluish-green in patches by the pest-control treatment given to them. The uniformity of these treasured fields of grape cultivation is broken by very narrow, tortuous paths up and down the steep slopes, used only by peasants.

In front of me, through the blur of the prop, was a veritable spectacle, though I knew that much more striking sights were in store for my hungry eyes. Here were what are called pre-Alps—the lower mountains north of the white masses with eternal snow, and they were gradually drawing nearer to me. The Tiger was set at the attack angle of 15 deg, which should bring me after some 90 minutes' flying to an approximate altitude of 14,000ft.

Passing over the famous Castle of Chillon I wondered what the ghost of that ancestor of the Italian royal family, Peter the First Duke of Savoy (presuming that he was buried in the damp vault below), might be mumbling as I flew over his thousand-year-old fortress. Soon I was over the first mountain, leaving the Roches de Naye—with its funicular—and the chain of the Oberland on port side.

At 1127 I passed to starboard of the Grand Muveran, only a bare 100ft above its level. This was my first striking impression of these great masses of granite, showing all round the way in which prehistoric dead material had been thrown to the surface of Mother Earth in distinct layers of that kind of stone peculiar to the Alps. Here I performed my first acrobatic feat by squeezing the joystick between my knees, setting my camera for action and, with a slight kick of port rudder, taking a picture of the Grand Muveran's summit.

Troubled Air

Though I was just above the altitude of the peak, near the 10,000ft mark, which I reached after a very gentle ascent through perfectly smooth air, I was suddenly met by violent up-currents, a most unpleasant sensation, the reason for which suddenly struck me. Under me was a sheer 7,000ft drop into the Rhône Valley! Never before had the realization of emptiness beneath affected me in any way; but this sudden voidness of space sent a weight, like one of those granite blocks, flying into my stomach. Fortunately the new panorama quickly unrolling before my eyes soon brought a sense of relief: The Matterhorn had suddenly appeared before me, though still quite a distance away.

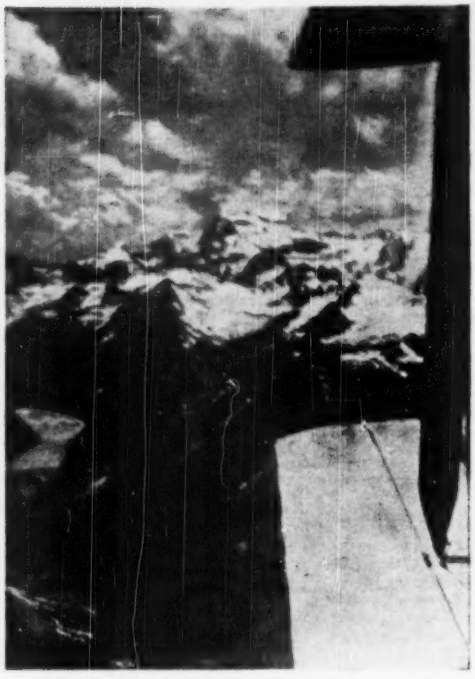
I had by now to give more attention to the increased wind which was slowing my progress, with a harder call on fuel. The ever-falling temperature was biting fiercely at my barely protected face, but I was all eyes, as directly to starboard, 30 miles away, Mont Blanc glittered under the cloudless sky.

The great mountain cut its profile right into the blue, with the Dents du Midi—the east slopes—and the seven sharp needles pointing the beauty of the scene to the beholder. Now the Grand Combin was dominating my track, and I paid my tribute to her magnificence by another port kick to the rudder to put her picture in my camera. This time a gust of wind very nearly sent the apparatus flying into space.

The Matterhorn was approaching nearer and nearer: there it was, seen through the mist of the airscrew—a dark needle-like rock 20 miles away. I was now so happy and thrilled that I found myself singing in a hoarse, high-pitched voice; or was it only the laughter of the Gremlins dancing on my lower starboard wing?

At 1135 hours I was over and crossing the Val d'Hérens with a lake-like hydraulic power reservoir deep in its upper part; to the east, the Valley of the Rhône was stretching as far as I could see, with some mist rising.

Suddenly the Tiger Moth was fighting a losing battle. She would not, or could not, climb any more. The up-currents were throwing us from port to starboard as the warm air from the sunny west side of the valley roughly pushed one wing up and the cold air from the east slope hammering the other down. I really was not very happy; and a lot of



"By the time I reached 13,800ft the aircraft was only two miles away from the Matterhorn, with the Dent Blanche just passing to port. . . ."

"white stuff" was blowing in from the South and Italy. I quickly put my nose down to a nearly level position, then started circling, gradually climbing again. Now I was keeping my eyes on the petrol gauge up there above the tank: that "wobbling" gauge-knob was going down fast . . . half my fuel had already gone. But the oil situation was O.K.

By the time I reached 13,800ft the aircraft was only two miles away from the Matterhorn, with the Dent Blanche just passing to port, so near that I grabbed my camera once more, the stick tight between my knees; and I pocketed her too. With the increasing roughness of the air I could, I thought, only reach the 14,000ft with difficulty; so I quickly made up my mind that I would have to be satisfied with looking at the old warrior from no higher altitude. Keeping about 1,000ft away from the summit, I went round him in a bank of about 30 deg to port. I was more or less level with the top, and now passing over a glacier which reflected arctic icy light up to me, while flimsy little cumulus-like clouds rushed S.S.E. below me. This glacier, I presume, was the one closing the highest end of an Italian valley; but again and again I was directing an anxious eye on the instruments. I saw the ridge on the Italian side of the Matterhorn, dark and so steep that no snow could adhere there at this time of the year, and very little even during the winter season. The crest of the ridge was like the rough stump of a broken saw swinging past my port wing-tip, and only about 50ft away.

To starboard, the mass of Monte Rosa was most imposing, and ahead, far away, the distant Bernese Alps were piercing the light white clouds.

Still with the port wing down, a last back pressure on the stick brought me closely round the precipices seen from Zermatt. At this striking moment the whole fantastic scene was like a Dante's Inferno cooled down and petrified by some magic touch. I had to breathe deeply, again and again, to take it all in. I felt so desperately awed and lonely that only hours later, in the silence and darkness of the night,

could I bring back to my mind anything like the realization of where I had been and what I had seen. This giant of dead, hard, icy-cold substance stunned the senses. Yet it was beautiful, so sublimely fantastic; and the sun itself was trying with all its might to warm it up—and forever failing. The summit was now "flying" out of the sun and blinding me, so there was no question of taking a "snap" from this position. The famous mountain was already behind me, the adventure was coming to a close—and the petrol gauge was three-quarters down. During all the hard climbing, of course, the willing little engine had been working at full capacity.

I, on the other hand, had had less exercise, and now began to realize that my clothing was not nearly warm enough. I put the trusted Tiger's nose down, the wings level, the compass on 310 deg, and shook myself as much as my harness would allow. A wave of warmth, pleasure and satisfaction came over me; as pleased as Punch I was!

By 1210 hours, with higher air density and the temperature increasing, the engine was purring with gladness, and the frost marks on windscreen, leading edges and struts gradually disappeared under the warming sun. I myself felt as though warm oil had been poured into my frozen joints and put them in working order again.

After what the gods had allowed me to contemplate I feared that the rest of the journey might be monotonous. But the beautiful Lake Léman was even looking more beautiful; nothing had changed in the peaceful scenery below during my short absence in the realms of solitude, and as I flew on towards civilization I fell to wondering why such peace as I was leaving could not be injected into humanity.

Miles away, where the dark line of the Jura Mountains closed the horizon I could already see my home airfield, where, at 1235 hours, I touched-down a few minutes later, feeling pleased with myself, but nevertheless glad to find a strong hand behind me taking my harness away. I was soon enjoying a very hot cup of black coffee offered by the chief pilot to celebrate the safe return of the rash amateur.

Before closing I feel I must pay a tribute to the firm who made the experience possible by the good design and manufacture of the aircraft I used.

For the Aeronautical Bookshelf

"The Ships and Aircraft of the United States Fleet." Published at $2 by Ships and Aircraft, 2033 Rhode Island Avenue N.E., Washington 18, D.C. Limited quantity available in England at 12s 6d from F. B. Clark, Aeronautical Book Suppliers, 22, Felstead Avenue, Ilford, Essex.

THE U.S. Navy's seemingly complex—but "easy-when-you-know-how"—system of designating aircraft, whereby, for example, the latest Tay-powered version of the Panther becomes the Grumman XF9F-5, is fully explained in the latest edition of this handy American publication, which is packed with facts, figures and photographs of the American Navy and its air arm. Though handsomely printed on 48 pages of art paper, the publication seems expensive by British standards; but the price should not deter avid collectors of aircraft data.

"Slipstream—the Autobiography of an Aircraftsman," by Eugene E. Wilson. Published by the McGraw-Hill Book Co., New York. Price $4.50. Also obtainable, at 38s 6d, from the McGraw-Hill Publishing Co., Ltd., London.

THIS is an American "local-boy-makes-good" story, though not quite typical, for Eugene Wilson starts his narrative not as the proverbial newspaper-boy but as chief of the engine section of the U.S. Navy Bureau of Aeronautics, at a time when Naval airmen were regarded generally as being vastly inferior to paper-boys. Billy Mitchell had just made his spectacular demonstration to "prove" that the advent of the heavy bomber has made battleships as obsolete as dodos. Between Mitchell and his goal of an all-powerful independent Air Force, created at the expense of the Navy, stood Admiral Moffett, whose striking personality dominates the early part of the story.

"Apparently," writes Mr. Wilson, "this Army-Navy dogfight absorbed every waking hour of the combatants." To-day, nearly 30 years later, it is still going strong, although the U.S. Air Force has won its independence, and the U.S. Naval Air Service more than established its worth in war. Mr. Wilson is well qualified to tell the naval side of the story, as he helped to establish the technical standards of the Service and then, to prove that he was no mere "back-room boy" took a naval pilot's course and made his first deck-landings at the age of 39 on the highly dangerous deck of the old *Langley*.

After pioneering the concept of a carrier task force, he was lured out of the Navy by "big business," and he became president of the Hamilton-Standard Propeller Corporation. From then on, *Slipstream* tells of the trials and achievements of the U.S. aircraft industry between wars, and of how it was put on its feet by French and British orders just in time to prepare it for the greatest industrial effort in history in World War 2.

One can meet in this book the giants of that industry—Glenn Martin, "Dutch" Kindleberger, Igor Sikorsky, Fred Rentschler . . . and Eugene Wilson himself, for by 1940 he was president of the whole United Aircraft Corporation, and, three years later, chairman of the Aircraft Industry Association—a position he held until 1949, when he resigned in order to be free to express his views fully in *Slipstream*.

As one would expect, he preaches the policy of "Air Power for Peace," and although, by British standards, the result sometimes lacks personal modesty, it forms a worth-while addition to the record of American aviation development. J. W. R. T.

BOOKS RECEIVED

Wireless World Diary, 1951. Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price: morocco leather, 5s 6d; rexine, 3s 8d.

"The Autocar" Motorist's Diary, 1951, Iliffe and Sons, Ltd. Price (morocco leather) 5s 6d; (rexine) 3s 8d.

"Amateur Photographer" Diary, 1951. Iliffe and Sons, Ltd. Price (morocco leather) 5s 6d; (rexine) 3s 8d.

Elements of Practical Aerodynamics, by Bradley Jones (Fourth Edition). Chapman and Hall, 37, Essex Street, London, W.C.2. Price 40s.

The Performance of Civil Aircraft, by F. B. Baker. Sir Isaac Pitman and Sons, Ltd., Pitman House, Parker Street, Kingsway, London, W.C.2.

The A.B.C. of Civil Aircraft Markings, by John W. R. Taylor. Ian Allan, Ltd., 282, Vauxhall Bridge Road, London, S.W.1. Price 2s.

Science News, 17, Edited by J. L. Crammer. Penguin Books, Harmondsworth, Middx.

Taming the North, by Hudson Fysh. Angus and Robertson, Ltd., Sydney and London. Price 15s.

A Short History of the Second World War, by Strategicus. Faber and Faber, Ltd., 24, Russell Square, London, W.C.1. Price 16s.

Modern Gas Turbines, by Arthur W. Judge. Chapman and Hall, 37, Essex St., London, W.C.2. Price 32s.

Aircraft Engine Maintenance and Service, by Col. Rollen H. Dranke. Macmillan and Co., Ltd., St. Martin's Street, London, W.C.2.

Airways Abroad, by H. L. Smith. University of Wisconsin Press, 811, State Street, Madison, Wisconsin. Price $4.

Science News 18, Edited by J. L. Crammer. Penguin Books, Harmondsworth, Middx. Price 1s 6d.

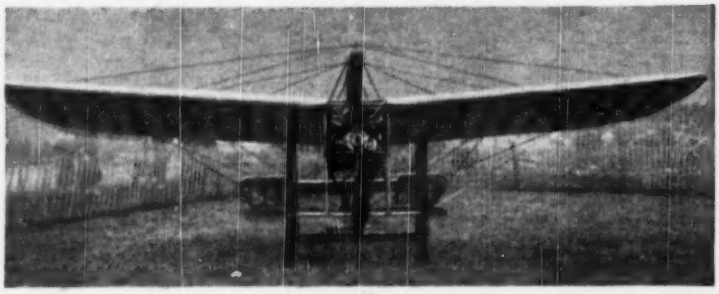
Roads of France, by A. G. Douglas Clease. Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 5s.

FORTHCOMING EVENTS

Dec.	22.	West Riding Aviation Centre: Annual Dinner and Dance.
Dec.	29.	R.Ae.S. (Weybridge): Annual Dance.
Jan.	6.	British Interplanetary Society: Symposium on the Orbital Rocket.
Jan.	10.	R.Ae.S. (Brough): "Problems of High-speed Flight," by H. Davies, M.Sc., F.R.Ae.S.
Jan.	10.	R.Ae.S. (Weybridge): "High-speed Flying," by S/L. J. D. Derry, D.F.C.
Jan.	16.	R.Ae.S. (Belfast): "Landing Gear and Equipment," by H. G. Conway, M.A., F.R.Ae.S.
Jan.	17.	R.Ae.S. (Preston): "Aircraft Materials," by Dr. H. Sutton, D.Sc., F.R.Ae.S.
Jan.	20.	Aircraft Recognition Society: Hurricane Trophy Competition.
Jan.	27.	Society of Licensed Aircraft Engineers: "Rocket Propulsion and Interplanetary Flight," by John Humphreys, B.Sc.(Eng.), A.M.I.Mech.E., A.F.R.Ae.S.
Jan.	30.	Society of Instrument Technology: "Machining of mal Instrument Parts, by K. J. B. Wolfe and P. Spear.
Jan.	31.	R.Ae.S. (Weybridge): "S. P. Cody," by G. A. Broomfield.
Feb.	3.	British Interplanetary Society: "Interplanetary Orbits," by Dr. J. G. Porter, Ph.D., F.R.A.S.
Feb.	7.	Royal United Service Institution: "Flying-boats in war," by A. V-M. P. H. Mackworth, C.B., C.B.E., D.F.C.

UNFAIR TO VETERANS?

By
A. H. CURTIS
A.R.Ae.S.



"The wings were set at a large incidence and since the wheels were far forward, the tail was lifted very high when taking off, to reduce drag."—a rebuilt Type XI Bleriot as shown at the R.A.F. display in 1936.

A First-world-war Pilot Criticizes Methods of Demonstrating Historical Aircraft

"PIONEER aircraft consisted of wood, canvas and string, flew but a few feet above the ground, and engine failures, which were plentiful, inevitably spelt disaster."

This sort of statement is, of course, entirely untrue. The string legend was handed down humorously by their pilots, who were no more brave or foolhardy than those of to-day. Their engines hardly deserved the term "reliable" as now understood, but, when trouble occurred, a pilot's first thought was not to abandon his aircraft to fall where it would, for the simple and sufficient reason that he had no parachute; the great number of his species who are still with us suggest that successful forced landings were not exactly uncommon.

The younger generation, however, appears to believe the legends and, unfortunately, finds confirmation when watching veteran aircraft participating in modern flying displays. Having seen the *apparent* extent of their flying ability and listened to various commentators, it is scarcely surprising that youngsters fail to appreciate that these machines are the forerunners of the aircraft of to-day and regard their antics as comic relief by some crazy inventor's brainstorms.

The Bleriot hops a few feet, the Deperdussin sometimes fails to do so and great astonishment is expressed because the Sopwith Pup achieves a loop. In fact, these exhibitions are a travesty of the early flying days and tend to discredit pilots whose names were once household words.

To justify the contention of many that these aircraft are not being shown to advantage, let us note, briefly, a few achievements by four types included in modern programmes, then advance a reason for the present situation and finally suggest a remedy to enable younger readers to get things into perspective.

The original Bleriot XI, with "fan"-shaped Anzani engine delivering 22 h.p., crossed the Channel on July 25th, 1909, in 37 minutes. It was not a typical "XI," since the one remembered for many successes was fitted with the so-called 50 h.p. Gnome. This rotary engine developed only 35 h.p., but revolutionized flying then in much the same way that the jet has to-day. With the airframe substantially unaltered, Chavez crossed the Alps and Moisant flew from Paris to London in 1910. The following year Beaumont won the Round-Britain Race, Garros reached 13,900 feet, and Prier flew non-stop from Hendon to Paris in under four hours, by an indirect route.

The type XI embodied controls working in the natural sense and precisely similar, directionally, to those of a modern aircraft. Lateral control for the early monoplanes was by wing warping, which remained until structural demands necessitated the use of ailerons. The wings were set at a large incidence and, since the wheels were far forward, the tail was lifted very high when taking-off, to reduce drag.

The Anzani prototype is not the best Bleriot XI for demonstration purposes, though, at a time when pilots and technicians had everything to learn, it reached 200ft while crossing the Channel. The exhibited Bleriot was restored by the late Richard Shuttleworth, who flew it with the characteristic cross-channel rudder; the present machine has this surface replaced by the type familiar on the Gnome model and also appears to require full elevator to fly level, which is not in character. The undercarriage incorporated an ingenious castering action but was not adaptable to increasing speeds, and the type disappeared in 1915.

Unlike the Deperdussin, developed mainly for racing, Bleriots performed the first aerobatics. In 1913 Pegoud looped a type XI, followed by Benfield Hucks, the first Englishman to do so; characteristically, the Russians claimed the first success. Rolling and spinning were then unknown, but inverted flying was achieved by a bunt!

The Deperdussin was probably not the easiest of the veterans to fly. Though there was little side area forward, its fin and rudder could not be described as "generous," and, as with most racing machines, it had no dihedral. Using the 28 h.p. inverted "Y" Anzani engine, Brock, Sabelli and Nardini competed with success against bigger machines of the same marque, and other makes, in pylon races at Hendon in 1912.

The existing "Dep" is another rebuilt veteran, and in the light of recent displays it is interesting to remember that, at Heathrow, shortly before Hitler's war, a Mr. Edmunds flew it on circuits which no old-timer could criticize.

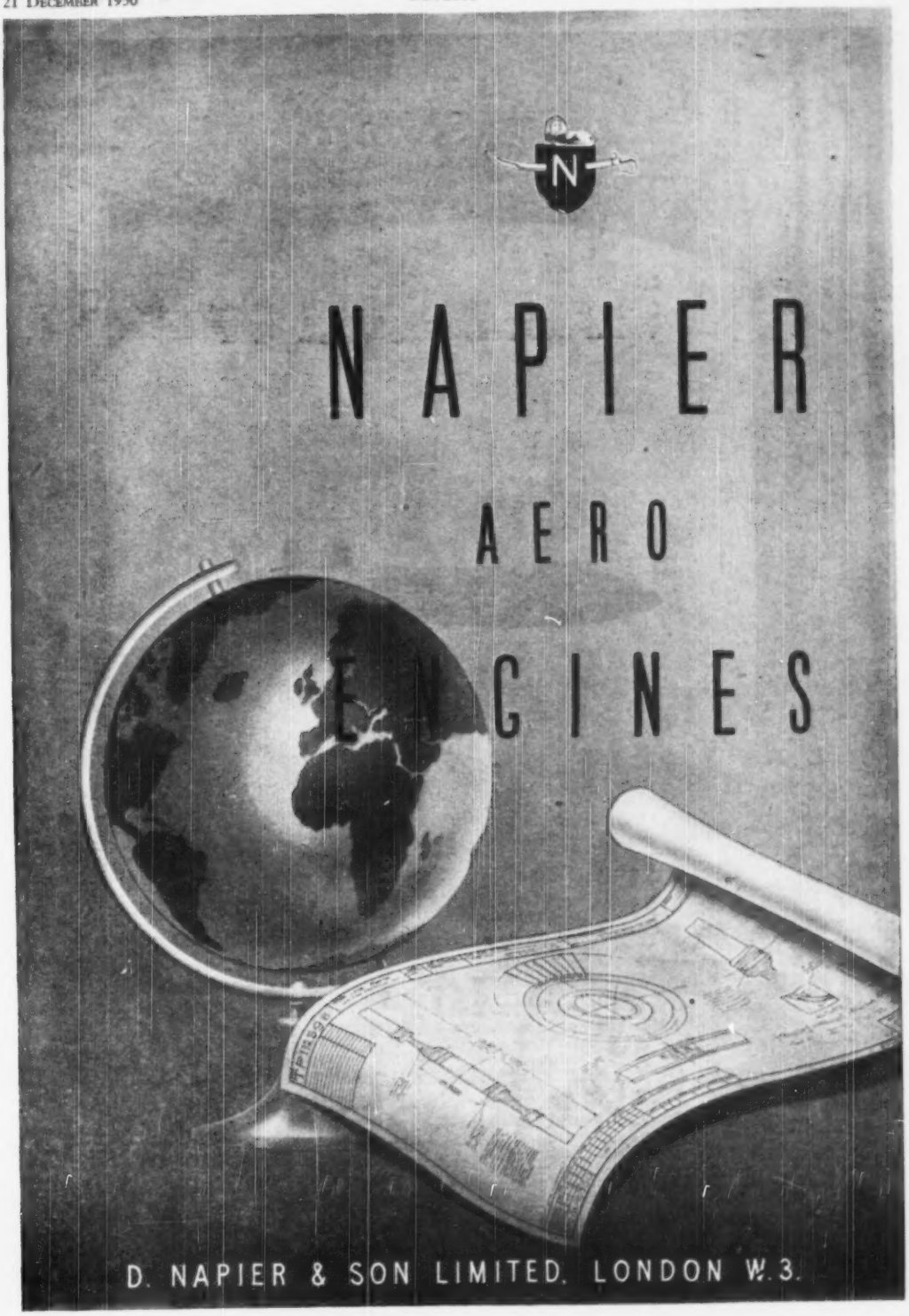
Though much could be written about the Avro 504K, some lesser-known facts must suffice. That great pilot F. P. Raynham cut his engine at 10,000ft over Brooklands and arrived over Hendon at 5,000ft; the year was 1913. In November, 1914, three 504s, on the world's first planned raid, bombed the Zeppelin sheds at Friedrichshafen.

As a trainer the 504K was ideal, for the dual controls were beautifuly harmonized, it was strong, fully aerobatic, had no vices, but would not permit undue liberties. It was not uncommon to see a first-class pilot complete a "dead-stick" landing from several thousand feet, alongside his hangar door, despite the absence of flaps and brakes.

As a three-seater conversion, still with the 110 h.p. Le Rhône rotary, the 504 was giving many thousands their first flights long after the 1914-18 war.

What of the Sopwith Pup? Introduced as a fighter with 80 h.p. Le Rhône in 1916 and tested by Harry Hawker, whose name the present Company adopted, her 104 m.p.h. at 6,500ft, service ceiling of 17,500ft and 3 hours' endurance compare favourably with aircraft of much later date. The pilot of the restored version has described the much-derided rotary engine as "one of the smoothest-running one could ever experience, even to-day," an opinion which old-timers are unlikely to challenge.

They cannot understand, however, why display commentators should announce in tones of mock or genuine surprise that the Pup is "about to loop." Some feel that if they could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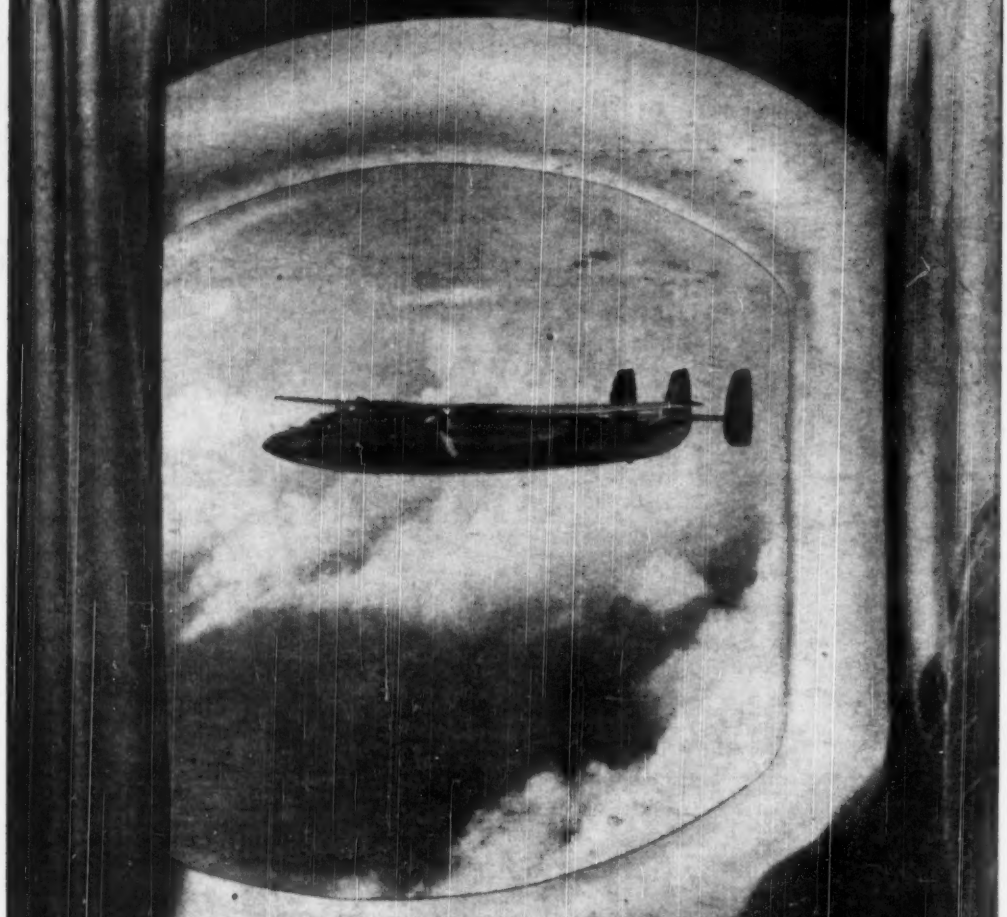
NAPIER
AERO
ENGINES
D. NAPIER & SON LIMITED. LONDON W.3.

AMBASSADOR

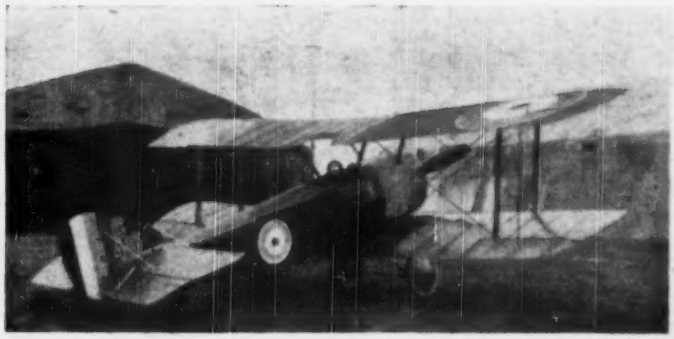
British European Airways' Elizabethan Class Airliner



Apart from the aerodynamic value of an unbroken span, the Ambassador's high-wing layout has many practical advantages in the matter of traffic handling and passenger-interest. In hardly any other civil aircraft, for instance, is it possible for every passenger to enjoy a continuous and unobstructed view of the landscape or cloudscape below.

AIRSPEED LTD., CHRISTCHURCH AND PORTSMOUTH, ENGLAND

In association with the de Havilland Enterprise



Sopwith Pup (80 h.p. Le Rhône) "somewhere in England," 1918. (Right) 110 h.p. Le Rhône exposed by push-rod fracture which removed the cowling of the author's 504K at 4,000 ft in 1919.

UNFAIR TO VETERANS? . . .

receive even slight remuneration for every loop, spin or roll they performed at the time when the Pup was born, it would ease the present burden considerably, for such aerobatics were all in the day's work a mere thirty-three years ago. Moreover, pilots were unhampered by manufacturers' restrictions limiting the number of turns of a spin, and they consider that the result of a contest with a modern trainer would not discredit the Pup. It is certain that the loop does not astonish the Pup's present pilot; perfection is so easy that he may only be shaken, literally, by meeting his own slipstream! Indeed, provided the stick is not eased fully back, it is difficult to imagine any aircraft more amenable to simple aerobatics.

The stories of First World War pilots proceeding overseas with 30 hours in their log-books were not exaggerated and, since aerobatics were often included at a fighter school, these early aircraft cannot have been very difficult to fly.

What, then, is the reason for "playing down" the veterans? Knowledgeable people will agree that from Bleriot XI to Comet in 40 years denotes rapid progress, so that the Industry can afford to show off these aircraft at their best. Could the displays be improved by famous old-timers who would be untroubled by the absence of parachutes, multitudinous instruments and equipment for use when emergencies fail? Or is the answer connected with the old question of keeping one's cake or eating it? Antiques are rare and it is no easy matter to maintain these collector's pieces in an airworthy state. Obviously, the more care bestowed, the less inclination to risk them by demonstration.

Therein lies the reason for seemingly timid usage, but is that fair to the pioneers? Either these aircraft are as airworthy as they were originally and can be risked by pilots competent to handle them as they were flown of old, or they should be exhibited statically only, with boards displaying their achievements and a note stating that they are now too valuable to the nation to be jeopardized by flying.

One feels that the present mid-way policy serves no useful purpose, amuses youngsters and fools, disregards history and irritates those who know the machines' capabilities.

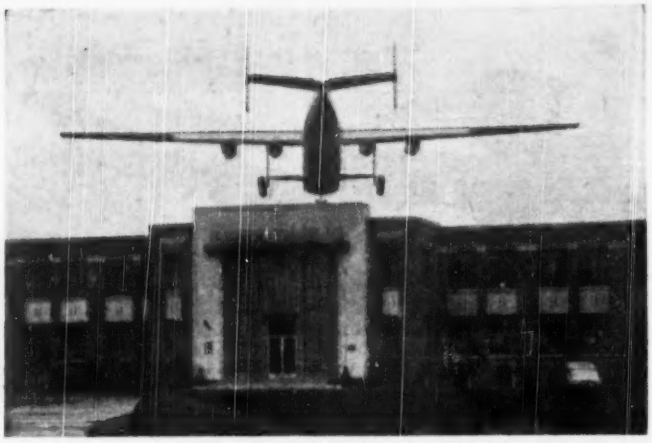
Will you, the pilots of the 1939 war who, rightly, loved your Spitfires and Lancasters, be amused in twenty-five years' time if you see one flown gingerly round accompanied by the announcement: "Now watch carefully, I really think he is going to retract his undercarriage"? Would your comments be printable?

R.Ae.C. AVIATORS' CERTIFICATES

BELOW is a further list of R.Ae.C. Aviator's Certificates covering the period from August 15th to September 8th, 1950. The previous list (July 14th to August 15th) appeared in *Flight* of November 23rd, and we hope to publish further names in an early issue.

No.	Name	Club or School	Date
26,681	Ronald Walter Powe ...	Elstree Flying Club	15.8.50
26,682	Alpin Macgregor ...	Strathtay Aero Club	15.8.50
26,683	David Haywood ...	Midland Aeroplane Club	16.8.50
26,684	Leo Senuk ...	Denham Aero Club	16.8.50
26,685	Henry Douglas Cliff ...	Southend Municipal F.S.	17.8.50
26,686	Eric George Thale ...	Rearsby Flying School	17.8.50
26,687	Raymond Anthony Croll Alston...	West Suffolk Aero Club	21.8.50
26,688	Clive Edward George Erl ...	Qualified Service pilot	21.8.50
26,689	Jack Kingston Jones ...	Service pilot u/t	21.8.50
26,690	David Bertram John ...	Marshall's Flying School	21.8.50
26,691	Austin Harry Wallace ...	Prestwick Airport	21.8.50
26,692	Christopher John Story ...	Southend Municipal F.S.	21.8.50
26,693	Richard Piers McCormack ...	Service pilot u/t	21.8.50
26,694	Robert James Anderson ...	Qualified Service pilot	23.8.50
26,695	Derek Anton Bradford ...	Qualified Service pilot	23.8.50
26,696	Omar Bahjat Salihi ...	Air Service Training	23.8.50
26,697	Afzal Mahd Sheikh ...	Qualified Service pilot	23.8.50
26,698	Kenneth Peter Henry Clarkson ...	Service pilot u/t	23.8.50
26,699	Kenneth Stephen Caswell ...	Service pilot u/t	23.8.50
26,700	John Scott Tweedie ...	Edinburgh University A.S.	24.8.50
26,701	Francis Basil Routly ...	Denham Flying Club	25.8.50
26,702	Kennath Bryan Neely ...	Southend Municipal F.S.	28.8.50
26,703	Thomas Edward Boynton ...	Leicestershire A.C.	29.8.50
26,704	John Stanley Witkowski ...	Denham Flying Club	29.8.50
26,705	Norman Edward Stevens ...	Service pilot u/t	29.8.50
26,706	Henry Rogerson Simmonds ...	Plymouth and Dist. A.C.	29.8.50
26,707	Thomas Gordon Clegg ...	Qualified Service pilot	29.8.50
26,708	Nani K. Wadia ...	Air Service Training	29.8.50
26,709	John Robin Pretty ...	Service pilot u/t	29.8.50
26,710	Thomas James Moulson ...	Service pilot u/t	29.8.50
26,711	John Dawtrey Wallis ...	Service pilot u/t	29.8.50
26,712	Neville John Rumbelow ...	Service pilot u/t	29.8.50
26,713	William Smith ...	Service pilot u/t	29.8.50
26,714	John Stuart Simpson ...	Service pilot u/t	29.8.50
26,715	Louise Sheppard Hydor ...	Southend and West Suffolk Aero Clubs	29.8.50
26,716	David McNicol Campbell ...	Qualified Service pilot	31.8.50
26,717	Michael Mayt ...	Qualified Service pilot	31.8.50
26,718	Malcolm Christison Muir ...	Service pilot u/t	31.8.50
26,719	Philip George Rogers ...	Qualified Service pilot	31.8.50
26,720	Hugh Tague Martin McCue ...	Qualified Service pilot	31.8.50
26,721	John Douglas Eames ...	Service pilot u/t	31.8.50
26,722	Ian William Percy Hale ...	Service pilot u/t	31.8.50
26,723	Ronald John Skinner ...	Service pilot u/t	31.8.50
26,724	Gordon Cunliffe Green ...	Qualified Service pilot	31.8.50
26,725	Frodrick Arthur Trowern ...	Portsmouth Aero Club	31.8.50
26,726	Reginald Norman Paris ...	Qualified Service pilot	31.8.50
26,727	Ian Duncan Mackersey ...	Service pilot u/t	31.8.50
26,728	Jack Roland Parsons ...	Qualified Service pilot	31.8.50
26,729	Colin Anthony Stirkes Haynes ...	Midland Aero Club	31.8.50
26,730	Ronald Ernest Edward Streeter ...	Coventry Aeroplane Club	31.8.50
26,731	Ronald Edgar Cooper ...	Hereford Aero Club	31.8.50
26,732	Raymond Wilbert Bustin...	Rochester Flying Club	31.8.50
26,733	Johnstone Robertson Edgar ...	Qualified Service pilot	31.8.50
26,734	Peter Kershaw ...	Airways Aero Club	31.8.50
26,735	Ray Hughes ...	Southend Municipal F.S.	4.9.50
26,736	Saad Eddine Kassim ...	Air Service Training	5.9.50
26,737	Edward Ernest Suish ...	Qualified Service pilot	5.9.50
26,738	Jack Andrew Sabeurin ...	Qualified Service pilo	5.9.50
26,739	Herbert Lawrence Foster ...	Midland Aero Club	5.9.50
26,740	Donald James Brodie Frear ...	Herts and Essex A.C.	5.9.50
26,741	Jayant Narayanrao Kowli ...	Air Service Training	5.9.50
26,742	Ian H. Keppie ...	Strathtay Aero Club	6.9.50
26,743	Scott Forrest Redfield ...	Prestwick Airport	7.9.50
26,744	Clifford Duncan ...	Lancashire Aero Club	8.9.50

HERE and THERE



IF A HELICOPTER CAN DO IT. . . . The size of the Blackburn and General Aircraft G.A.L.60 —and an unusual camera-angle—give the impression that the 162ft-span freighter is about to touch down, helicopter-wise, on the roof of the Brough factory. This final approach is, of course, well above the building.

Appreciation

TO the many friends who, individually or collectively, have sent Christmas greetings, the Editor and Staff of *Flight* extend thanks: their good wishes are heartily reciprocated.

Canberra Progress

REVIEWING its 1950 activities, the English Electric Company announces that Australia has begun production of the Canberra B. Mk.2. "It is probable," states the company, "that manufacture of the Canberra will also be undertaken in other overseas countries." America, Canada and France have been mentioned in this connection.

Latest Gipsy Queen

UTILIZATION of the Dove, in particular, will be improved by the 35 h.p. increase in take-off power authorized for the latest de Havilland Gipsy Queen—the Mk. 2, which is rated at 380 b.h.p. Modifications identifying this new version are redesigned pistons and gudgeon-pins, new cylinder heads with larger ports, a new c.s.u. drive ratio and modified fuel-injection equipment.

An initial batch of Queen 2s will be operated in Doves during the first half of 1951. Conversion sets—to bring existing Queen 70s to the new standard —will, it is expected, then be available, at a cost of between £300 and £400 according to the modification state of the engine—plus a few possible minor installational extras.

A.I.D. Retirement

MR. A. E. STEELE, who has been Principal Inspection Officer of the A.I.D., Southern Area, since 1942, recently retired from the Department. Mr. Steele, who is 62, began his aeronautical career as an inspector at the R.A.E., Farnborough, before the First World War, and entered the Aeronautical Inspection Department in 1914.

Sapphire-Thunderjets?

THUNDERJETS exported to European air forces may be powered by the 7,200-lb thrust Armstrong-Siddeley Sapphire turbojet, according to an American source. Curtiss-Wright recently acquired a licence to build this unit but, pending full-scale American production, 100 Sapphires may be imported from Britain for F-84 installation.

The standard F-84E Thunderjet attains 600 m.p.h. with 5,200 lb thrust from an Allison J-35 turbojet. Airframe limitations might prevent a Sapphire-powered version from utilizing the full benefit of 2,000 lb extra thrust in level flight, but the aircraft's rate of climb—and, consequently, its value as an intercepter—would be greatly improved.

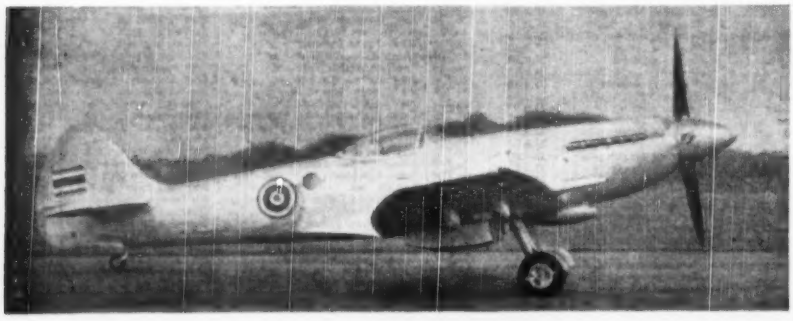
China's Air Force

ACCORDING to a Hong Kong source, the strength of the Chinese Communist Air Force is 400 aircraft, including transports and trainers. Basic training of pilots is undertaken at Chinese airfields but, says the report, further instruction is given in Russia, which has controlled Chinese Communist aircrew-training since 1947. Jet fighters are in service.

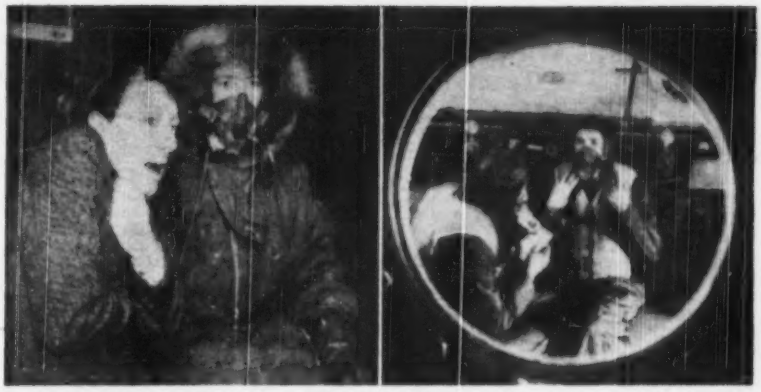
REFUELLERS REWARDED: Despite the cartoonist's suggestion on the page opposite, Col. David Schilling (centre) and Lt.-Col. William Ritchie (right) proved the practicability of flight-refuelling for fighters when, last September, they flew Thunderjets non-stop from Britain to America. They are shown receiving Oak Leaf Clusters to their D.F.C.s from General Vandenberg, American Chief of Air Staff, in recognition of their achievement.

Thunderjets in Korea

REPUBLIC F-84 Thunderjets were reported as being in action in Korea for the first time on December 13th. With its higher speed, longer endurance and heavier offensive load, the F-84 is an even more effective ground-attack weapon than the F-80 Shooting Star, which has been used with outstanding

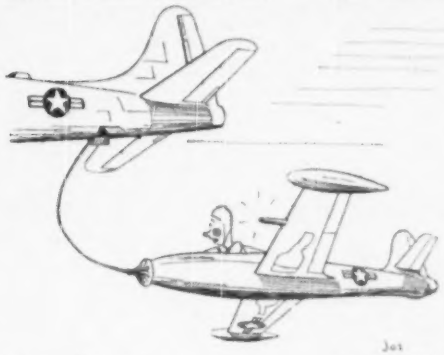


REFURBISHED FOR THAILAND: This smartly turned-out Vickers Supermarine Spitfire F.R.14 is the first of thirty purchased from the Ministry of Supply, reconditioned by Vickers-Supermarine and sold to the Royal Thai Air Force.



MEDICINE MEN: *Illustrated here are two aspects of the arduous work undertaken daily by doctors of the R.A.F. Medical Research Laboratory at Farnborough. (Left) Wearing an Arctic survival suit, one doctor has spent two hours at "40 below" without ill-effects; his refrigerated companion demonstrates feelings induced by a mere 40 seconds in the same ice-box without protective clothing. On the right, oxygen masks and pressure waistcoats are being tested against the effects of rapid decompression, a problem of particular topical interest.*

success throughout the campaign. But further increases in the activity of the Communists' Mig-15s might eventually force the U.S.A.F. into employing the 670-m.p.h. F-86 Sabre. The first British jet aircraft likely to see service in Korea is the Gloster Meteor 8, 36 of which have been ordered by the R.A.A.F.



Jet

Ashton Progress

SINCE the review *The Yield of the Year* (pages 583-596) went to press it has been learned that the Avro Ashton has completed 38 flights, totalling a little over 37 hours' flying. On flight No. 30 (November 1st), the aircraft was flown for the first time at it gross weight of 82,000lb. It is now being equipped with pressurizing and other equipment.

Airgunnery ?

VISITORS to the National Schoolboys' Own Exhibition in the Royal Horticultural Society's Halls at Westminster, London, will be encouraged to pierce holes in the fuselage of a Meteor—in order to provide Halton apprentices with an opportunity to demonstrate their skill in quick repairs. Boys will also be admitted to the Meteor's cockpit. The Exhibition will be opened on January 1st by Air Marshal Sir Basil Embry, A.O.C.-in-C., Fighter Command.

With Mamba and Nene

GOOD progress is reported with one of the lesser-known French prototypes—the turbojet- and turboprop-powered Breguet 960 naval strike aircraft, which was illustrated in *Flight* of November 16th. The first prototype, powered by an Armstrong Siddeley Mamba I (in the nose) and a Rolls-Royce Nene (in the mid-fuselage), is expected to fly next month.

It is reported that a second prototype will have new versions of the British power units—the Mamba 4, said to have a rating of 1,800 h.p., and a Nene up-rated to nearly 5,600 lb thrust. Maximum designed speeds of the first and later versions of the Breguet 960 are quoted as 530 m.p.h. and 590 m.p.h. respectively. Designed for operation from carriers against submarines or surface vessels, the aircraft will carry 1,800-2,600 lb of bombs and rockets, or a torpedo. It has no guns. With wing-tip tanks, its endurance is expected to be over four hours; all-up weight is about 22,000 lb.

NEWS IN BRIEF

IT is announced that Mr. V. St. J. G. Van der Byl has been appointed joint aviation manager of Shell-Mex and B.P., Ltd.

* * *

A reunion of those who were with A. V. Roe and Co., Ltd., at Manchester or Hamble before 1915 is being organized by Mr. J. C. C. Taylor, Flat 2Z, Artillery Mansions, Victoria Street, London, S.W.1.

* * *

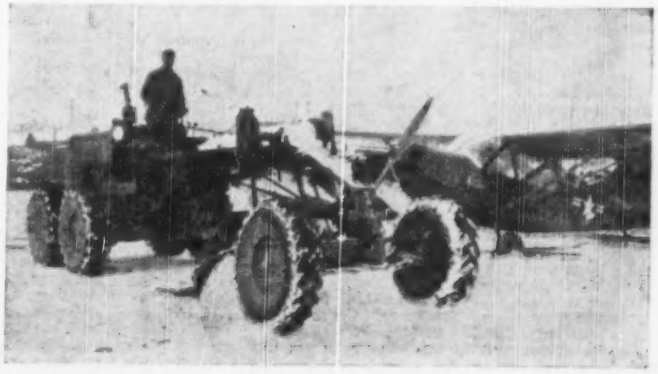
Armstrong Siddeley Motors, Ltd. announce an arrangement whereby Diesel Equipment, Ltd., of Uxbridge, will manufacture a range of generating and lighting sets incorporating the Armstrong Siddeley diesel engine.

* * *

Tubular Construction Systems, Ltd., 335 Battersea High Street, London, S.W.11, have published leaflets giving details of their portable crush barriers, which should be of interest to air-display organizers. The units—familiar to Farnborough Show visitors—are strong, compact and easily assembled.

* * *

In appreciation of his former work as an executive of Scandinavian Airlines System, Mr. Peter H. Redpath, now sales vice-president of Canadair, Ltd., has been awarded the Royal Order of Knight of the Dannebrog by the King of Denmark. He has already been similarly honoured by Norway and Sweden.



COLD WAR: *Snow-plough at work on the airstrip at Hamhung, Korea. In the background are L-5 (Sentinel) A.O.P. aircraft.*

NEWS of the WEEK

R.Ae.S. Lecture : Blackbushe Ceremony : Iron Curtain News : a Club "Classic" : and a Good Film

CLEAR-AIR TURBULENCE

IN a paper, *Clear Air Turbulence over Europe*, given before the Royal Aeronautical Society on Thursday, December 14th, Dr. G. S. Hislop, of British European Airways, made a notable survey of this intriguing topic. The lecturer, who was in charge of the B.E.A. Gust Research Unit (the early activities of which were reported in the July 15th, 1948, issue of *Flight*), gave in the main body of his paper an interpretation of the statistical results derived from the work of the Unit. A digest of Dr. Hislop's paper will be published in an early issue of *Flight*.

CIVIL-CUM-SERVICE

LAST Friday, December 15th, the inauguration ceremony of the first Royal Auxiliary Air Force Transport Squadron took place at Blackbushe airfield, when the Under-Secretary of State for Air, Mr. Aidan Crawley, M.B.E., M.P., handed over to S/L. R. H. McIntosh, D.F.C., A.F.C. (chief pilot, Airwork, Ltd.), the log-books of the first of the Valetta aircraft with which the squadron is to be equipped.

The new squadron will recruit its personnel as far as possible from the staff of Airwork, Ltd., Britain's largest independent air-transport concern, and under the designation No. 622 (Transport) Squadron, Royal Auxiliary Air Force, will be part of Home Command, administered by Headquarters, No. 62 (Southern) Group. With an establishment of 57 officers and 107 other ranks, the squadron is the result of a scheme put forward some three years ago by Sir Archibald Hope and Mr. A. G. Miller, both of Airwork, Ltd., and both former group captains in the R.Aux.A.F.

All the R.A.F. are providing are two Valettas, and suitable officers' and other ranks' messes at Blackbushe. Everything else will be provided by Airwork.

MORE ABOUT THE MIG

THAT the Soviet Mig-15 single-jet fighter, now appearing in appreciable numbers in the Korean battle, should easily exceed Mach 1 if correctly flown, is the opinion of U.S. Naval pilots, according to *Aviation Week*. The pilot of a Grumman Panther is said to have spotted a Mig about 2,000ft below him, looking like an easy kill. As the Panther lined up, however, the Mig emitted two white puffs and then a stream of white smoke from the tail pipe, leaving the Panther as if it were "standing still." No black smoke has been observed during the engagements.

Pilots remark on the extremely sharp sweep-back, and a photograph scaled-up from a 16-mm gun-camera film shows excrescences well outboard beneath each wing. Should these be drop-tanks they would appear to be of unusually small capacity.

On December 14th the biggest air battle of the Korean campaign took place near the mouth of the Yalu River. Four Shooting Stars engaged 24 Mig-15s but no losses were sustained by either side.

HERTS AND ESSEX DO IT AGAIN

IF any viewed with alarm the choice of December 13th as the date for the twelfth annual dinner and dance of the Herts and Essex Aero Club, they soon had cause to revise their views on such superstitions, for the guests who filled the ballroom at the Park Lane Hotel, London, quite obviously enjoyed themselves to the full; dinner, entertainment and dancing all matched the high standard of these happy occasions in previous years. Fortunately, the dreaded fog did not materialize to hamper guests on their homeward journey, although it is possible that a few suffered slight personal haziness.

There were some brief speeches, "The Club" being proposed by A. Cdre. Vere Harvey, C.B.E., M.P., who is president of the Lancashire Aero Club. The chairman, Mr. Geoffrey de Freitas, M.P., Parliamentary Under-Secretary, Home Office, responded. Mr. F. E. Darlow, secretary of the Club, proposed "The Guests," distinguished individuals and a large contingent from Fairoaks Aero Club being singled out for special mention. The reply came from the Rt. Hon. Arthur Henderson, Secretary of State for Air, who quoted "In vain is the net spread in sight of the bird." Mr. G. H. M. Miles, chairman of the executive committee, Association of British Aero Clubs and Centres, concluded this more formal part of the programme.

In the various speeches the Herts and Essex Club was deservedly praised for its energy and enterprise, for the war record of its members, and for its perseverance in these times so difficult for private flying. The A.T.C. flying scholarship scheme was considered good so far as it goes, and the results were reported as "encouraging." Next year, it seems, there will again be 200 scholarships to award, and there is a possibility of an extension of the scheme. An estimate of £90,000 was given as the cost of trebling its scope. Arrangements have been made for A.T.C. pilots to continue their training with the R.A.F.V.R. There was a mention of a new Air Ministry scheme for training some dozens of R.A.F. technical officers to fly at the flying clubs. The picture was not so encouraging for purely private flying. For example, it was revealed that part of the Herts and Essex aircraft fleet had had to be laid up, and both the number of flying hours and the number of private licences decreased last year.

Dancing and games continued until 1 a.m. The dinner committee for this successful occasion, under the chairmanship of Dr. V. A. Ercolani, comprised Messrs. Peter Ayles, F. E. Darlow, Roger Frogley, S. A. Perrin and A. R. Saward.

DOCUMENTARY—AND SENSIBLE

MEMBERS and guests of the Society of British Aircraft Constructors last week attended a special screening of the film *Spotlight on Britain's Wings*, at the British Council Theatre, in London.

Latest in the "Spotlight" series of documentaries made for 20th Century-Fox by the British Rayant Picture Company, it sets a high standard of technical skill and accuracy. Typical is the jet-fighter flight-refuelling sequence, for which a cinécamera was attached inside the canopy of the Meteor, "by the pilot's right ear," to show audiences how (apparently) easy it is to push a round peg into a funnel-shaped hole at the end of a flying hose-pipe.

The film begins by explaining why British airlines now have to use American equipment, and includes at this stage some informative shots of progress being made with the underground tunnels leading to the site of the future terminal buildings at London Airport. Then come views of the magnificent Princess flying boat under construction at Cowes and of the Hawker P.1081 being flight demonstrated by "Wimpy" Wade.

After seeing the first air-to-air film of the Brabazon, audiences are next "invited on board the Comet" for a test flight to 43,200ft. Well-written dialogue and careful photography make this one of the most fascinating parts of the whole film and a tribute to the skill of Rayant's cameraman, for there is no jiggery-pokery. Shots of the altimeter registering 43,200ft, and of unbroken clouds far below the aircraft, really were filmed at that altitude—the highest, incidentally, at which any commercial motion picture has ever been taken.

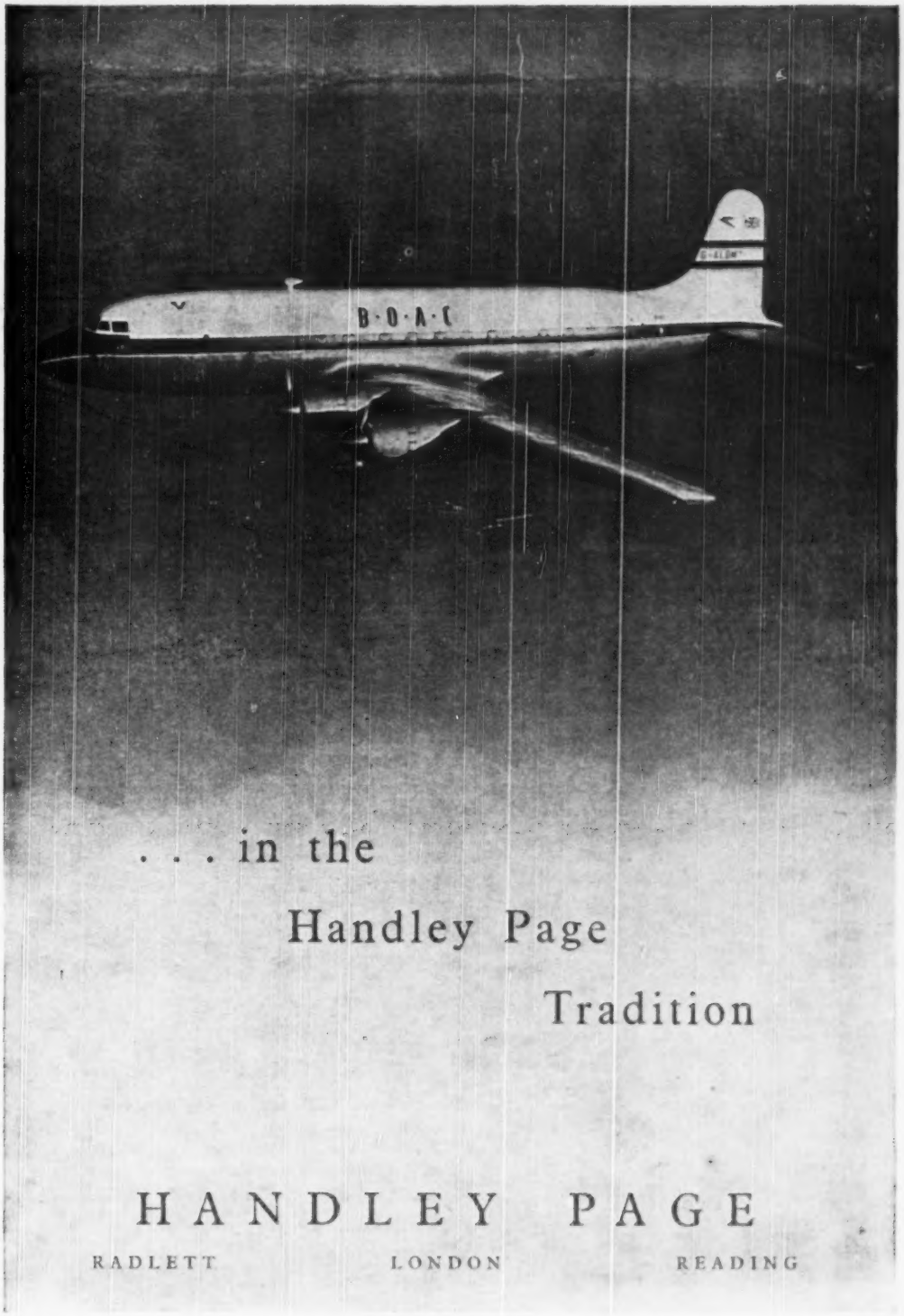
Back to earth, the cameraman takes his equipment aboard an electric train and, with the co-operation of British Railways, and a special camera shutter set to take only 2.4 exposures a second instead of the usual 24, proceeds to show what it would be like if "the 8.15 to Town" travelled at 500 m.p.h. like the Comet. The result is truly terrifying.

Finally, we are given glimpses of aircraft at the R.A.F. Display at Farnborough, including the dear old Avro 504, the Canberra, helicopter "elephant circus" and the Meteor and Vampire aerobatic teams. It is easy to regret the omission of such superb aircraft as the Viscount and Supermarine 535, but one aircraft looks very much like another to the average "cinemaddict," and a film such as this gives a better overall picture of British aviation achievement than would a mere catalogue of 60 aircraft types crammed into 18½ minutes' running time.

Spotlight on Britain's Wings is now being shown on the Gaumont and Odeon circuits, and well justifies a visit to your local cinema.

CORNERCROFT PROGRESS

THE fourteenth annual general meeting of Cornercroft, Ltd. (specialists in presswork, tooling equipment and other requirements of the aircraft industry) was held on December 8th at Ace works, Coventry. Mr. J. Alan Corner, chairman and managing director, in his presiding address, reported that the results of the year had been very satisfactory. During that period, the company had acquired the whole of the issued share capital of James Beresford and Sons, Ltd., at a cost of £309,000. Mr. A. E. Hudson, secretary to Cornercroft, Ltd., since 1945, was appointed a director of the company.



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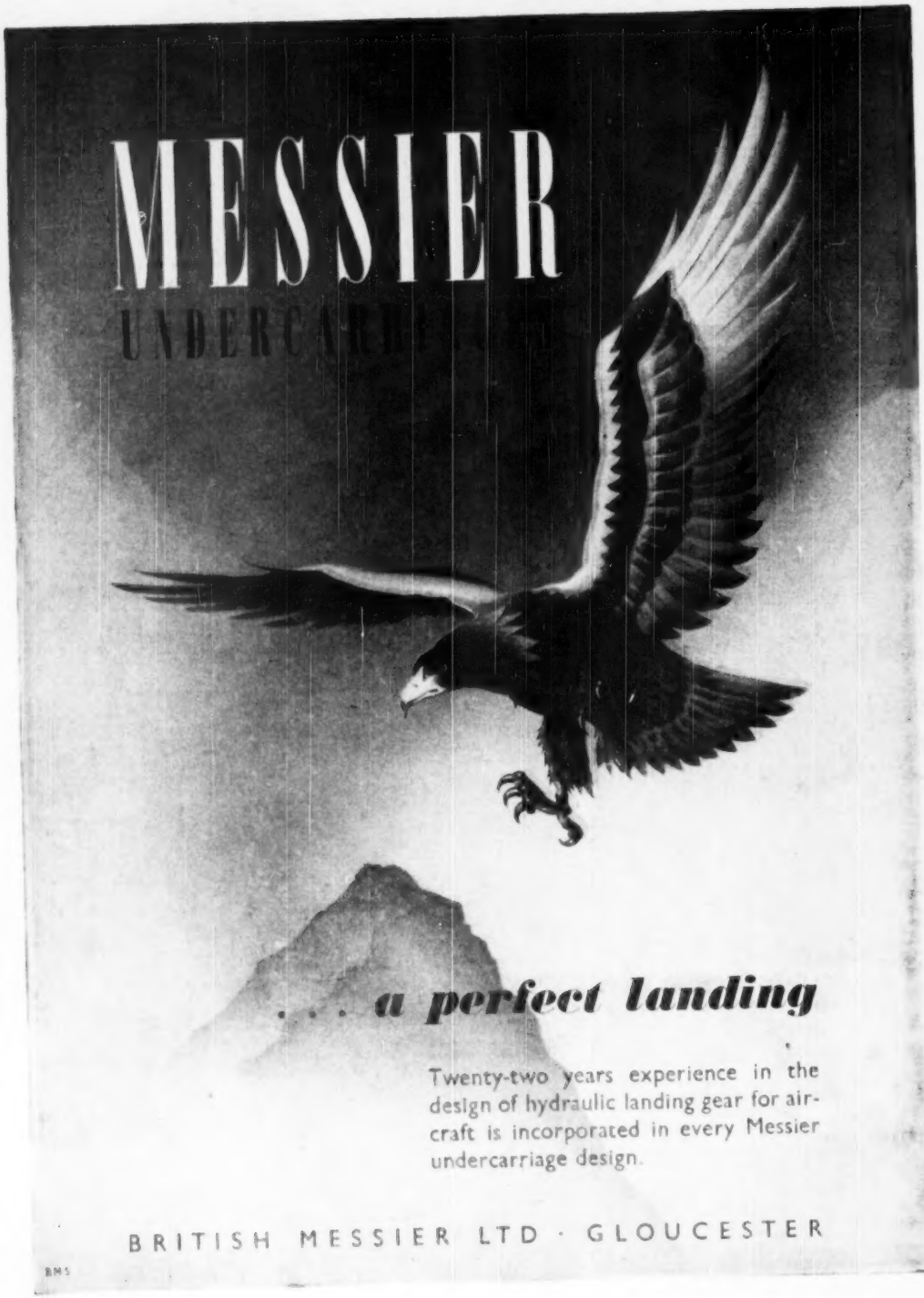
Handley Page

Tradition

HANDLEY PAGE

RADLETT LONDON READING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CIVIL AVIATION NEWS

Q.E.A. IN 1949

THE annual report of Qantas Empire Airways for operations up to December 31st, 1949, has been submitted to the Australian Minister for Civil Aviation. It reveals that, after taxes had been deducted, the company made an operating profit of £233,837. Capital was increased during the year by £1,100,000 to a total of £3,623,000; the extra funds were used to purchase five new DC-4s and to provide additional buildings in New Guinea.

The principal operating statistics show that total route mileage increased during the year to 23,465; operating revenue rose by 20 per cent, passenger mileage by 25 per cent and mail and cargo ton-mileage by 70 per cent. The total of 127,000,000 passenger miles was flown without a fatality.

One point of which Qantas is particularly proud is that, despite devaluation and heavy increases in operating costs, fares were held at 1948 levels. As reported in *Flight* of November 9th, these rates have since had to be increased by about 10 per cent; but are still among the lowest in the world.

THE CHARTER MARKET

ACCORDING to brokers' reports, shortage of suitable aircraft is again hampering negotiations on the charter market. Rapid increases in available freight have in many cases forced charterers to make arrangements for surface transport. The shortage is said to be caused mainly by the contracts which are now being undertaken on behalf of the Air Ministry and the Corporations.

Although, in the main, the recent Government contracts have involved the use of heavy aircraft, a certain number of DC-3s are also being used by the Corporations. Those still available on the charter market have large commitments for Christmas tourist traffic, for which fixtures were settled some time ago.

Halifaxes are reported to have been in great demand for the movement of large, bulky cargoes, but as there is now only one company in Britain still operating this type of machine, freight rates on some routes have risen by as much as 50 per cent. Charterers are apparently not willing to pay such charges, and the brokers consider it probable that, soon after Christmas (when some of the Corporation sub-contracts expire) operators of large aircraft will revert to normal quotations.

Recent business has included an arrangement for three B.O.A.C. Stratocruisers to carry 70 passengers to Cairo and for four Argonauts to fly to Singapore. These machines are all to carry wives and families of Servicemen. Two [illegible] were chartered from London to Japan with parties of pa[illegible], and a number of DC-3s have flown from London to Persia and Iraq, carrying passengers and oilfield equipment.

SILVER CITY ACTIVITIES

THE highly popular cross-Channel car ferry operated by the Bristol freighters of Silver City Airways carried 40 per cent more traffic this year than in 1949. Between early April and the end of November some 3,950 cars and 900 motor cycles (the latter, in many cases, with sidecars) were lifted. The number of schedules flown represented an increase of 30 per cent on the previous year's traffic, and during the peak period in August, frequency on the Lympne to Le Touquet route was stepped up to 24 services a day.

Under the winter rates, which were introduced on September 19th, cars up to 14ft in length are now carried for a single fare of £19 instead of £27, while the reduction for larger vehicles is from £32 to £25.

Besides operating the cross-Channel car ferry, Silver City Freighters have been in great demand for general charter work. Fitted with 44 seats, they are proving popular for the carriage of ships' crews to and from foreign ports.

COOLER CABINS FOR B.O.A.C.

ALL of B.O.A.C.'s Hermes, Argonauts, Stratocruisers and Constellations are now wearing the new Speedbird livery, whose distinctive colour scheme of white, blue and silver is designed to serve a useful as well as a decorative purpose. The upper halves of all fuselages are painted white—the result of a series of experiments which the Corporation has conducted in the past year to investigate ways of reducing cabin temperatures while aircraft are on the ground at airports in hot climates.

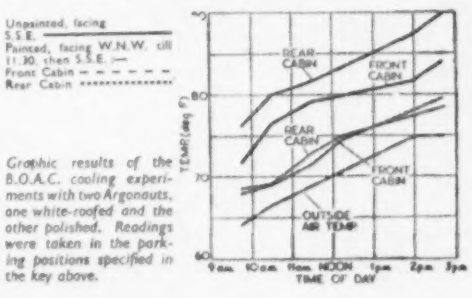
The heat-reflection theory as applied to aircraft was first propounded by Dr. Ray Martinelli, of the University of California, who pointed out that the advantage of a white-painted surface over polished aluminium lay in its superior ability to reflect the short wave-lengths predominant in solar radiation in the temperature range under consideration. Laboratory experiments were not particularly successful, as it was found to be extremely difficult to reproduce artificial heat-ray spectra identical with those of sunlight. A series of practical tests were therefore undertaken, from the results of which it was found that, in direct sunlight and with little or no wind, the temperature under a white-painted aluminium sheet is from 10 to 15 deg F less than that under an otherwise similar sheet of polished aluminium.

At London Airport B.O.A.C. exposed two Argonauts side by side in the sun—one with the conventional polished upper fuselage and the other with this surface painted white. Both were subjected to the sun's rays at the same time of day and for a similar period; cabin doors were closed. The sky was cloudless, wind 15kt and outside air temperature 70.5 deg F.

From the results obtained—they are reproduced in the graph below—it was evident that the greatest cooling effect was achieved if white-painted aircraft were parked in such a position that they headed directly into or away from the sun, thus preventing it from penetrating directly into the cabins and permitting very little radiant heat to fall on any surface not painted white.

B.O.A.C. considers that a reduction in cabin temperature of from 12 to 15 deg F is obtainable under these conditions in the tropics, while even in the more temperate conditions at London Airport differences of 12 deg were twice achieved on one day. When the aircraft were parked in haphazard fashion without regard to the sun's direction, it was found that the differences were much less pronounced, although they still existed.

PALM COURT: Airliner interior of the days before the dodo was deader than the dodo. Every seat a real basket. Alley for a very thin steward. Curtains for the passengers. . . . This was way back in 1920, when the Bristol Aeroplane Company had already foreseen that post-war air travellers would no longer be content with mere roofed-in cockpits. The 14-seater Bristol Pullman (four 400 h.p. Liberty engines) established a new standard in airliner comfort.



Graphic results of the B.O.A.C. cooling experiments with two Argonauts, one white-roofed and the other polished. Readings were taken in the parking positions specified in the key above.

CIVIL AVIATION NEWS

BREVITIES

MR. G. S. HILL has been appointed Civil Air Attaché in South America, with residence in Rio de Janeiro, in succession to G/C. D. S. G. Honor, D.F.C. Mr. Hill is expected to take up his appointment towards the end of the month.

* * *

In a bid to speed up the flow of urgently needed workers from Europe, Canada has offered to provide free air passages for immigrants from Britain.

* * *

It has been estimated that in the 14 days up to Christmas, B.E.A. will have carried 22,000 kg of mail to Germany alone. To cope with the holiday rush on freight and mail services, which are doubled in frequency on all Continental routes; the Corporation has had to charter a number of Halifaxes to augment its Dakota fleet.

* * *

The Prime Minister of Australia has declared that there is no truth in the rumours, current for some time, that negotiations are in hand to bring about a merger of A.N.A. with the State-owned company, T.A.A. Incidentally, T.A.A.'s profit for the year ended June 30th has been announced as £214,818.

* * *

Scotland's principal airport, Prestwick, appears to have established itself as one of the outstanding holiday attractions of the Ayrshire coast. During the season from April to October over 43,000 visitors to the public enclosure enjoyed watching the spectacle of airliner arrivals and departures. On August 10th, when H.R.H. Princess Margaret arrived at Prestwick by air, nearly 3,500 visitors paid for admission. Plans are now being made to provide more amenities for next season's visitors.

* * *

Provisional traffic returns issued by Air France for the first nine months of this year show a considerable increase over the figures for the corresponding period of 1949. Aircraft mileage rose by 20 per cent and the amount of freight by 23 per cent, while the total of 73,250,000 revenue ton-miles flown was 17 per cent higher than the 1949 figure.

Next January, Air Algérie will introduce three S.O.30P Bretagnes on services between France and North Africa.

* * *

Q.E.A. is reported to have reached agreement with Trans-Oceanic Airways by which that company will have to forgo the services to the New Hebrides formerly operated in competition with Q.E.A. In return, Qantas will enjoy the monopoly of services to Lord Howe Island.

* * *

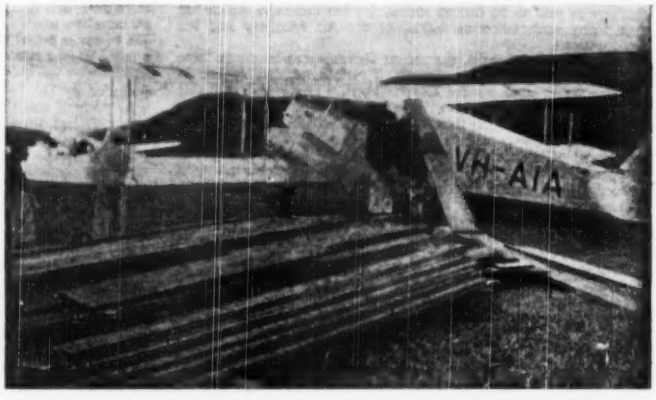
Mr. Igor Sikorsky has recommended the immediate introduction of helicopter passenger services with present equipment rather than wait while larger machines become available. He is of the opinion that present types are safe for passenger operation even in congested areas.

* * *

Matters that are worrying residents of villages in the vicinity of London Airport were brought to the notice of the Minister of Civil Aviation when a deputation called upon him last week. Aircraft noise, and the plans for extending the airport, were among the subjects discussed. Lord Pakenham held out no hopes of major changes of policy but agreed to further talks.

* * *

P.A.W.A. has announced its intention of operating 20 DC-4s, made up from its own and other airline fleets, in an augmented Pacific airlift. During the past three months there has been a gradual reduction of commercial participation in U.S.A.F. operations, but this civil share is now to be expanded to approximately four-fifths of its level at the height of the airlift activity.



LUMBERJACK: The carriage of large planks of cedar, to be used in the manufacture of pre-fabricated houses and furniture, is one of the unusual tasks performed by the Australian-built D.H. 84 Dragons, which are still giving faithful service with Q.E.A. and Mandated Air Lines in New Guinea.

CLUB and GLIDING NEWS

ON Saturday, December 9th, Christchurch Aero Club—the re-organized version of the former South Hants Ultra-Light Aero Club—held an informal dinner to introduce members to their new headquarters. Two aircraft bringing guests from London were unable to leave base because of bad weather, but the Club was particularly glad to welcome Mrs. Lindsay Neale, secretary of the U.L.A.A., to which organization the C.A.C. is affiliated.

During the evening the chairman, Mr. K. R. Scales, spoke of the Club's intention "to offer a helping hand to those fired with the ambition to fly aircraft." Anyone caring to join, he said, would be offered instructional flying in Austers at 40s per hour—which is certainly one of the cheapest rates available on this type of aircraft.

The subsequent dance, which proved a great success, was attended by most of the 75 guests to whom tickets had been allocated.

Prospective members should contact the Club's secretary, Mr. E. B. Weston, at 82, Fairmile Road, Christchurch, Hants.

* * *

FLYING time recorded by the Wiltshire Flying Club for November amounted to 122 hr, bringing their total for the year to 1,822 hr. With (at the time of writing) only one month left to complete the year, the Club is hoping that the weather will provide an opportunity for the target figure of 2,000 hr to be achieved. Winter flying in Tiger Moths is reported to be popular and it is thought that there is a good chance of reaching the desired figure.

Work is in progress on re-equipping the engine workshop and the Club hopes to be able to make a definite announcement shortly about its plan to overhaul Cirrus Minor IIs. It is intended to undertake the complete overhaul, testing and issue of the necessary certificate at an inclusive cost of £70.

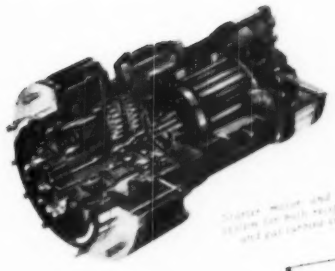
* * *

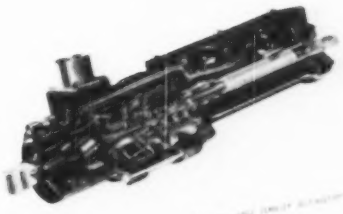
FOR gliding enthusiasts in Poland, according to a report from that country, the past season is reported to have been a very good one. Several records were again broken, mostly by newcomers to the record table.

On June 6th two pilots of the Silesian Aero Club made a formation flight from Katowici to Pinczów, a distance of 220 km. This effort broke two national records—and, as it was made by two machines in formation, it is believed to be a unique achievement.

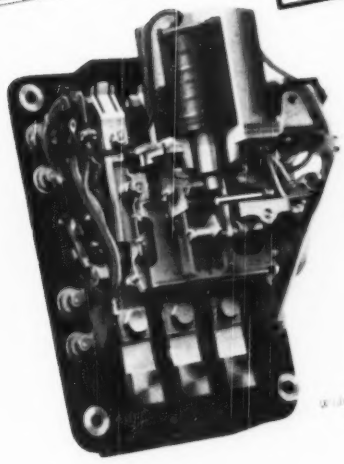
A new national record for goal flights was set up on June 12th by Zbigniew Kidzewicz, who flew a distance of 345.5km in a Mucha sailplane. The new record-holder, who is 19 years of age, only began gliding in 1949. Other notable flights included a 380 km cross-country and an altitude flight of 5,000 metres in a single-seat machine.

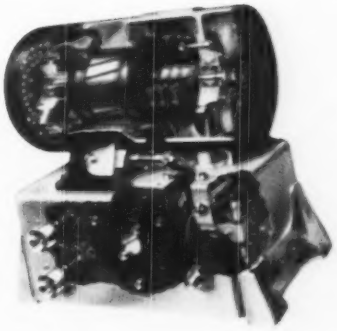
The world is looking up . . . to **BRITISH** design





MEETING THE NEEDS OF 1950





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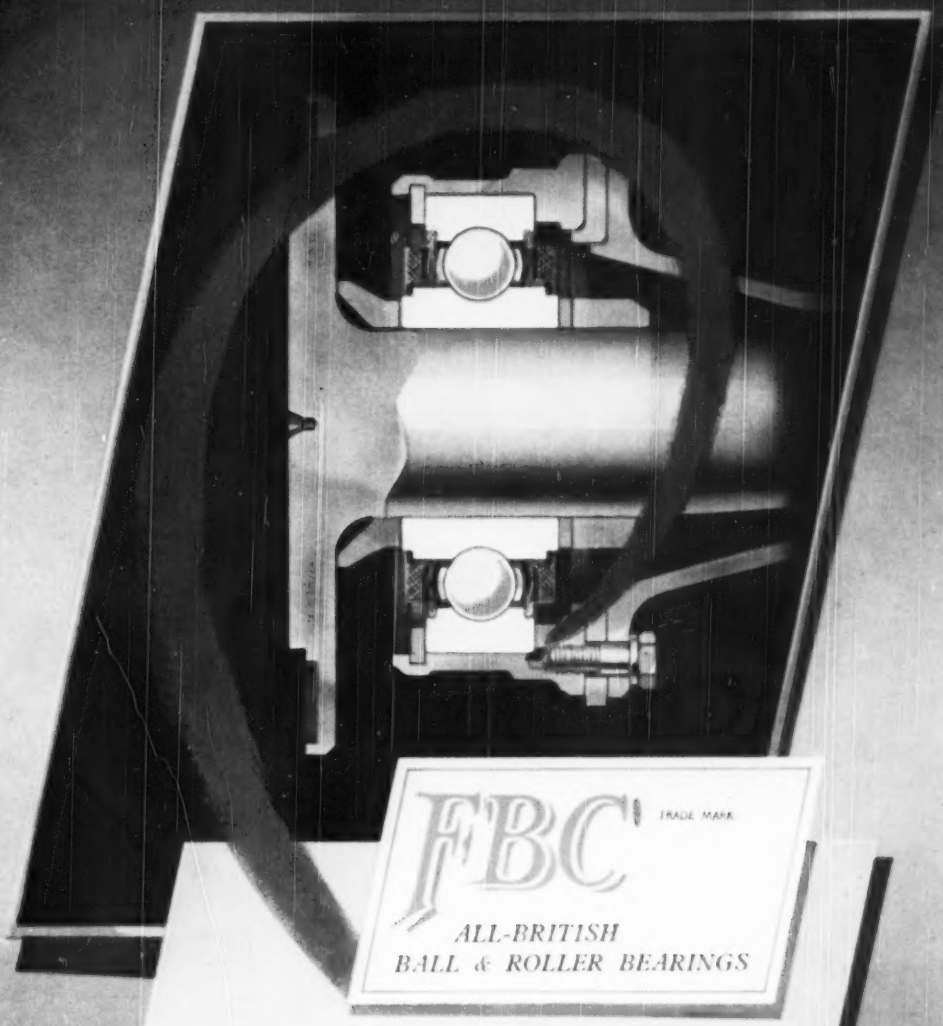

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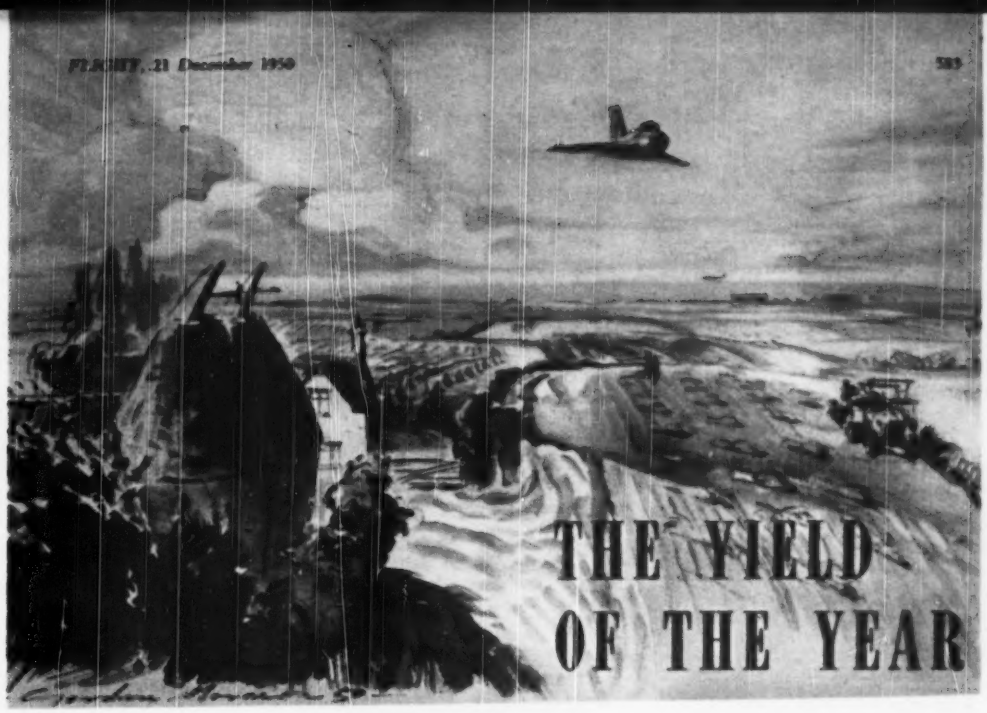


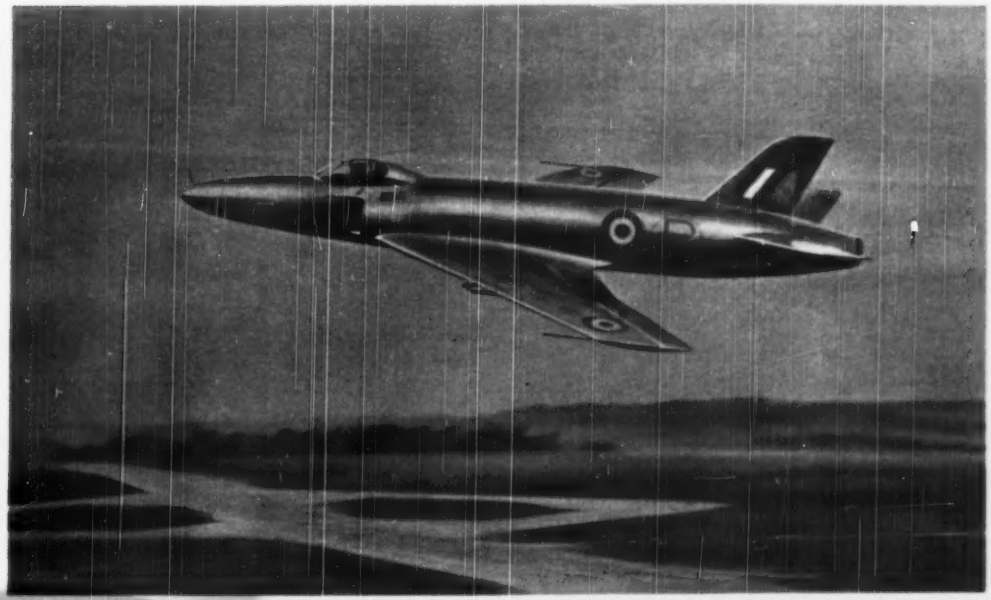
THE YIELD OF THE YEAR

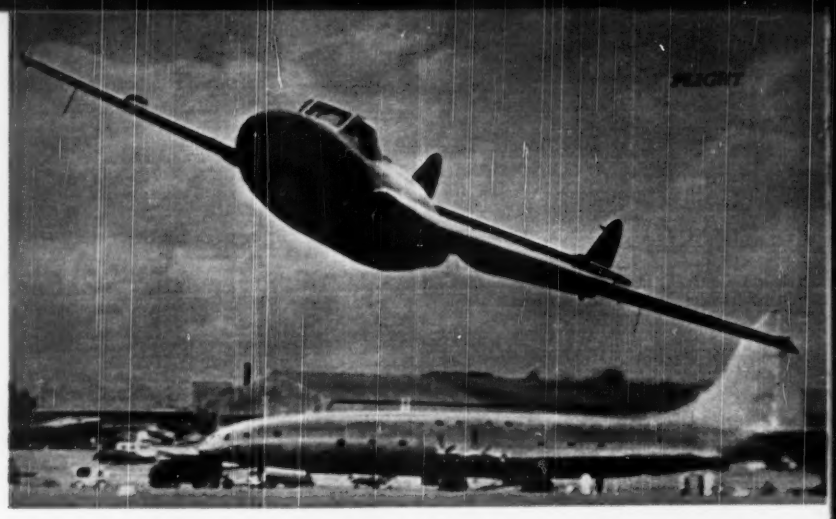
How British Aircraft Types Have Increased in Number and Improved in Quality in the Past Twelve Months : Fifteen Important First Flights : Deltas now Flying

GAPS in the range of British aircraft available at the war's end have been progressively filled, until now—at the turn of the half-century—the available selection can be viewed, if not with complacency, then with real satisfaction. It is true that, compared with their enterprising and well-endowed American rivals, British manufacturers are even yet unable to offer a few desirable, even urgently necessary, types of aircraft; but in general there is far more cause for congratulation than for concern. This will have been apparent to everyone fortunate enough to witness the Society of British Aircraft Constructors' Display and Exhibition at Farnborough in September, when 29 turbine-powered and 30 piston-engined machines were presented. Their average weight was over 30,000 lb and their average speed of the order of 400 m.p.h.

That our newest high-speed prototype fighters (e.g., Hawker P.1081 and Supermarine 535) concede nothing to any comparable foreign single-seater extant, is certainly not an overstatement, though we must acknowledge America's eminence in the development of heavy two-seaters designed specifically for night and all-weather fighting. Happily, in the Avro Canada Canuck the Common-

The Vickers-Supermarine 535 fighter. It is powered by a Rolls-Royce Nene centrifugal turbojet for which afterburning is provided.





de Havilland Venom N.F.2 two-seater, radar-equipped, night fighter (de Havilland Ghost turbojet), a carrier-borne development of which will be quantity-produced for the Royal Navy in succession to the piston-engined Sea Hornet N.F.21 now in service.

THE YIELD OF THE YEAR . . .

wealth can boast a type without superior in this vitally important class, while in recent Venom and Meteor adaptations Britain has jet night fighters capable of rendering excellent service until more specialized all-weather machines (already taking shape in her factories) become available. For work at extreme heights the Venom is unexcelled.

In the bomber class, it is true, this country can still show only one jet-propelled example—the English Electric Canberra; but what an example this is, with its fighter-like performance and superlative handling qualities! Moreover, the months ahead should yield at least two other jet bombers, heavier and larger than the Canberra, and, it may confidently be predicted, generally more effective than any comparable types now flying in America or elsewhere.

Symptomatic of Britain's resolve to strengthen her position in the military transport field is the Blackburn and General Aircraft G.A.L.60; but, regrettably, no announcement of a military flying-boat to rival or surpass the new Convair XP5Y-1 is forthcoming.

Our newest machines for Naval use—fighters, anti-submarine and strike aircraft alike—are unexcelled, though it must be admitted that, as in certain other fields of air equipment, design often antedates production and operation by a regrettably long period. Technically, the Fairey, Blackburn and Short turbine-powered, deck-landing, anti-submarine machines are especially meritorious.

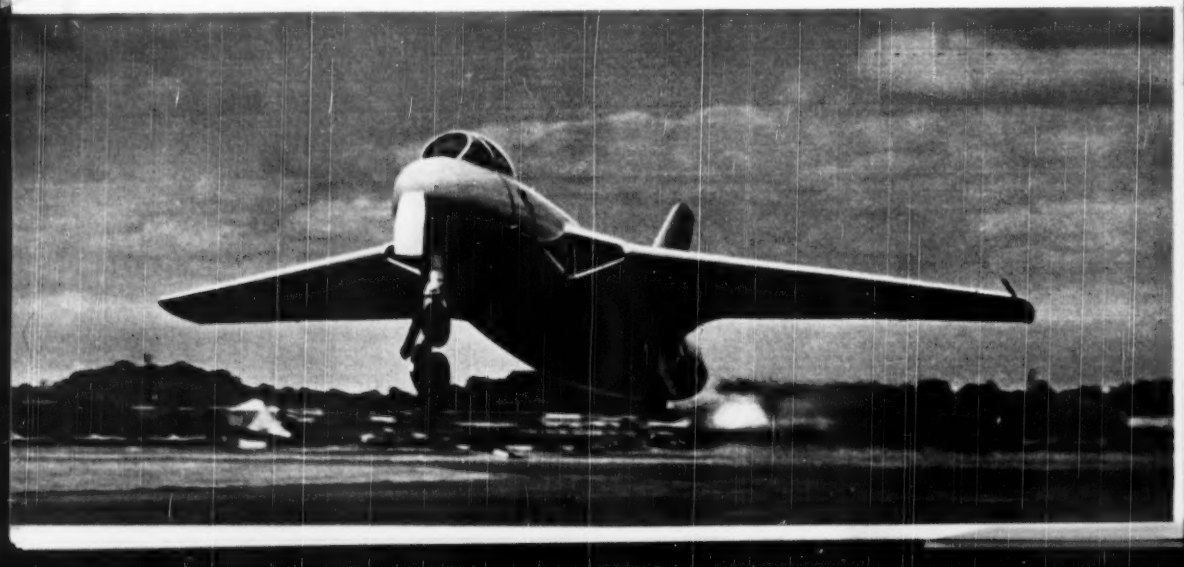
NOTABLE FIRST FLIGHTS OF 1950

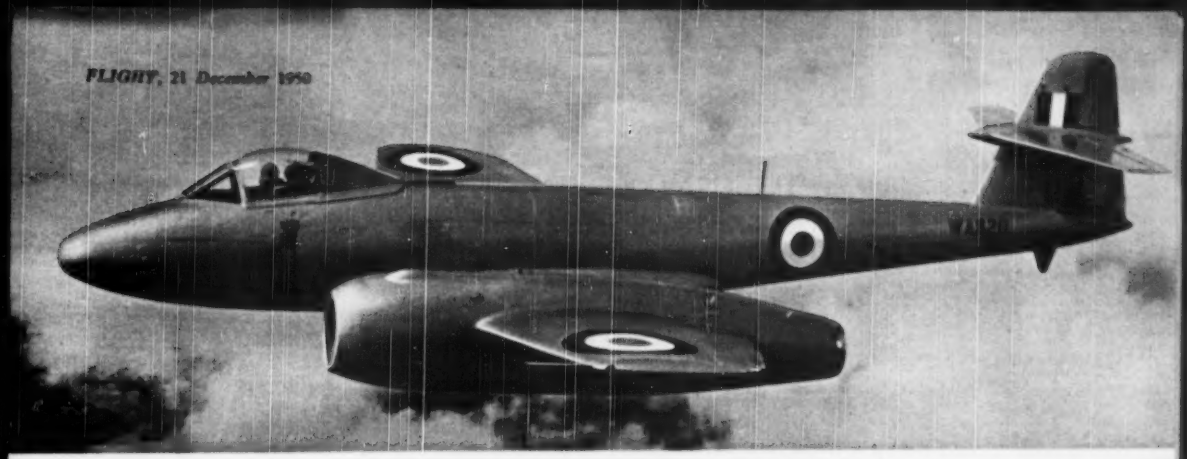
Aircraft	First Flight	Pilot	Airfield
Avro Canada Canuck	Jan. 19th	S/L. W. A. Waterton, A.F.C.	Malton (Canada)
Percival P.56	Feb. 23rd	R. Wheldon	Luton
Vickers Tay-Viscount	Mar. 15th	G. R. Bryce	Wisley
Handley Page (Reading) H.P.R. 2	Apr. 24th	F/L. D. J. Broomfield, D.F.M.	Woodley
de Havilland Heron	May 10th	G. H. Pike	Hatfield
A. W. (Gloster) Meteor N.F. 11	May 31st	S/L. E. G. Franklin, D.F.C., A.F.C.	Baginton
Hawker P.1081	June 20th	S/L. T. S. Wade, D.F.C. A.F.C.	Farnborough
Blackburn and General G.A.L.60	June 20th	F/L. H. Wood	Brough
Blackburn Y.B.1	July 19th	P. G. Lawrence, M.B.E.	Brough
de Havilland Venom N.F.2	Aug. 22nd	J. Wilson	Hatfield
Vickers-Supermarine 535	Aug. 23rd	Lt. Cdr. M. J. Lithgow	Chilbolton
Vickers Viscount 700	Aug. 28th	Capt. J. Summers, O.B.E.	Brooklands
Avro Ashton	Sept. 1st	J. H. Orrell	Woodford
Avro 707B	Sept. 6th	W./C. R. J. Falk, A.F.C.	Boscombe Down
Boulton Paul P.111	Oct. 6th	S/L. R. H. Smythe	Boscombe Down

In trainer production the year has been a fruitful one. In the Handley Page H.P.R.2 and Percival P.56 we have piston-engined machines of the highest promise; the Vampire Trainer bids fair to eliminate threatened Dutch and Italian competition, while the Westland Wyvern T.3 meets a need for a fast Naval turboprop trainer.

Especially gratifying among the year's first flights was

Hawker P.1081 fighter (Rolls-Royce Nene with afterburner), developed from the P.1052. Production of the P.1081 is well under way in Australia.





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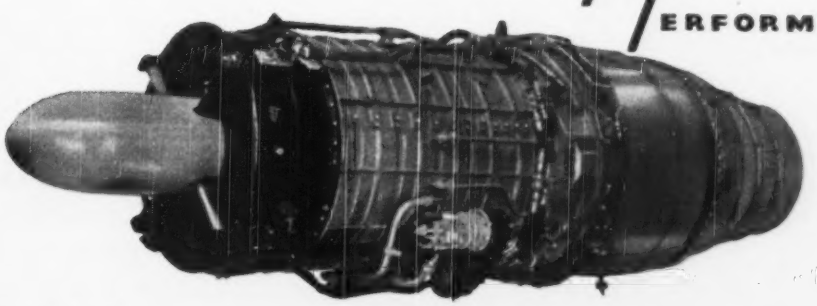

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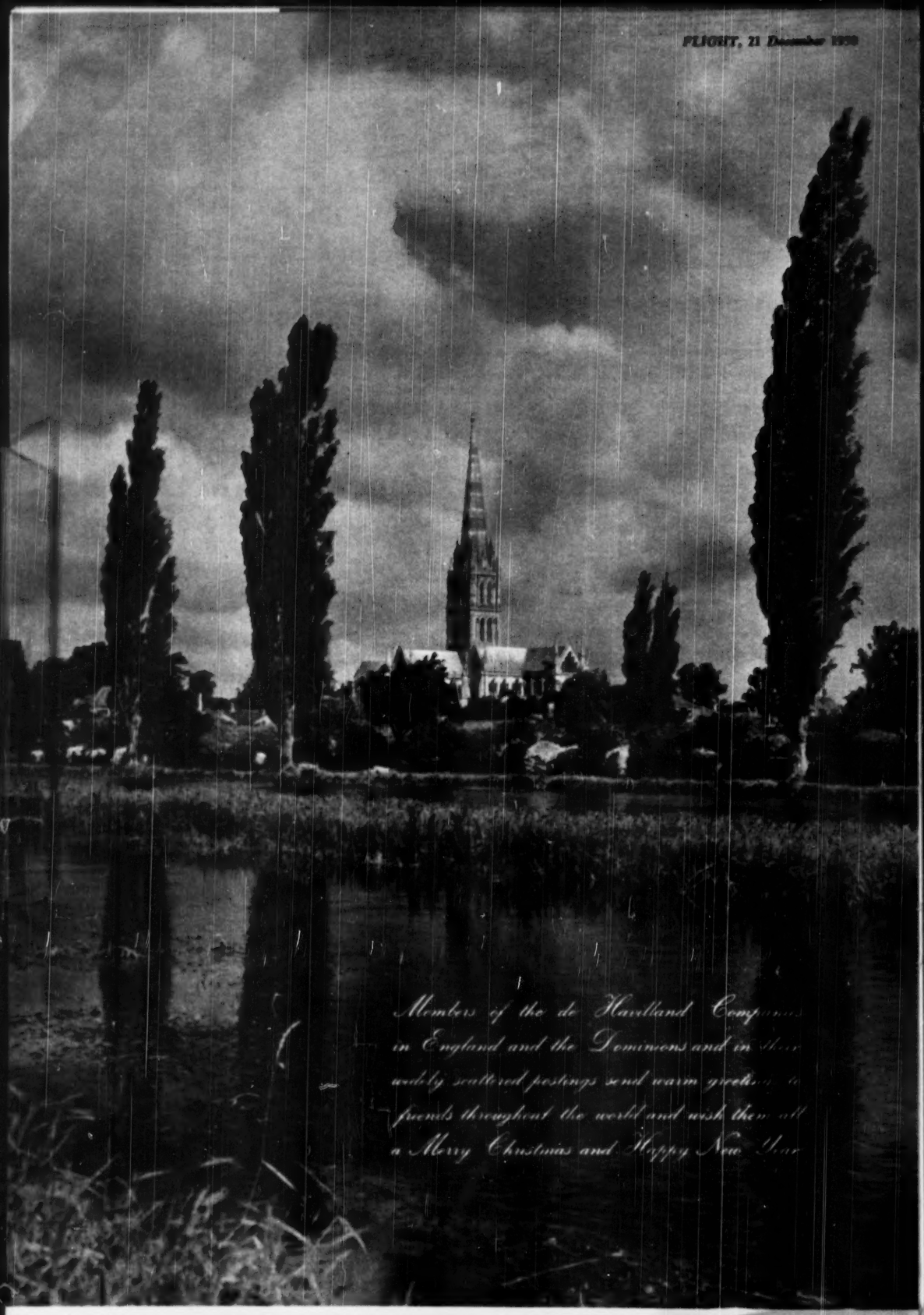

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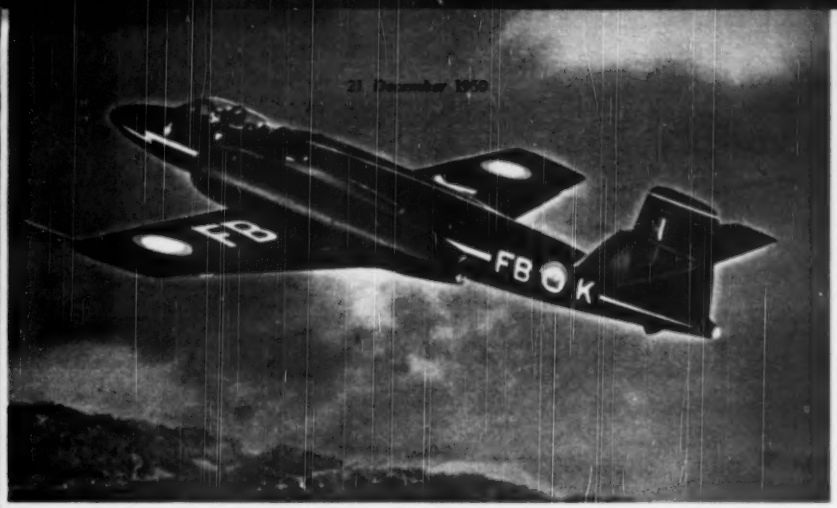


Avro Canada CF-100 Canuck long-range, all-weather, fighter prototype, with two Rolls-Royce Avon turbojets. Production Canucks, for the Royal Canadian Air Force, will have Avro Canada Orendas.

that of the Boulton Paul P.111 delta-wing research aircraft, which, together with the "B" variant of the Avro 707, of similar basic characteristics, greatly enhances our position in the field of exploratory flight. Flying laboratories, typified by the Avro Ashton, and engine-development aircraft such as the Tay-Viscount, Sapphire- and Avon-Meteors, Sapphire-Hastings, Proteus-Lincoln and reheat Lincoln, are also making a vital contribution to our store of technical knowledge, applicable to military and commercial designs alike.

Though in 1950 no wholly new turbine-powered transport aircraft were added to Britain's already impressively complete range, important developments were recorded in respect of the de Havilland Comet, Vickers Viscount, Armstrong Whitworth Apollo, Handley Page Hermes V and Mamba-Marathon. Concurrently, work went ahead on the piston-engined Bristol Brabazon prototype and on the new D.H. Heron and improved Percival Prince feederliners. A higher-powered development of the Prestwick Pioneer made a welcome appearance.

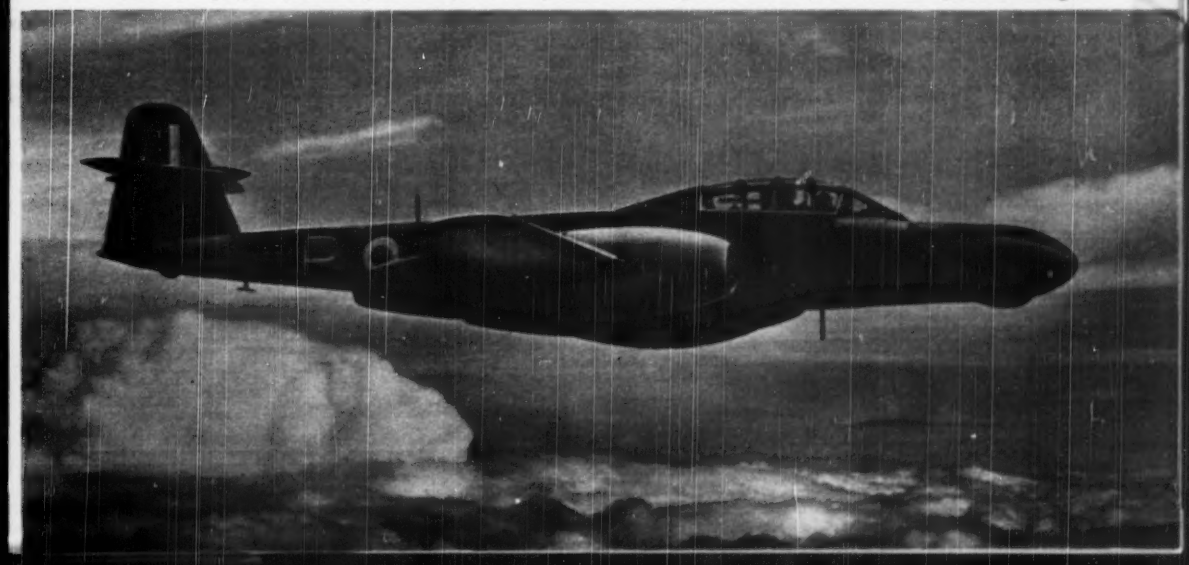
In order to determine the true significance of the aforementioned developments they must be considered in their appropriate categories. This undertaking is unfortunately bedevilled by security restrictions applying to military and research machines; but sufficient has been demonstrated and otherwise made known to permit a fair assessment.

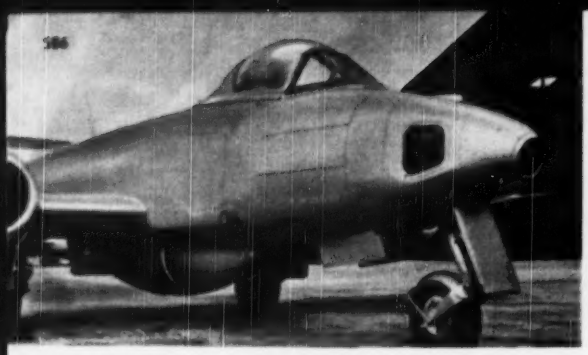
Day Fighters.—In the modern single-seat, "all-swept" intercepter category the Industry now offers two pre-eminent types—the Hawker P.1081 and Vickers-Supermarine 535. Both are powered with a single Rolls-Royce Nene turbojet, having a static rating of 5,000 lb at 12,500 r.p.m. but delivering a much greater thrust with recourse to afterburning ("reheat") for which provision is standard. Having a long tail-pipe, inherited from the Attacker Naval fighter (now in quantity production for the Royal Navy), the 535 proved readily adaptable to receive the power-boosting system. The precursors of the P.1081, however, had bifurcated tail-pipes, to allow the maximum fuel tankage to be disposed in the fuselage, and to provide for the afterburner it was necessary to abandon this arrangement in favour of a single tail-exit pipe. The Nene 4 in the Hawker fighter has provision for reheat to a temperature of 1,500 deg absolute.

Detailed structural and aerodynamic particulars are withheld, but it can be said that the wing area of the P.1081 is 258 sq ft; the thickness/chord ratio 10 per cent constant; and the sweep-back at quarter-chord, 35 deg. The tailplane is mounted high on the swept-back fin, and is adjustable to permit trimming throughout the speed range—especially in the transonic zone.

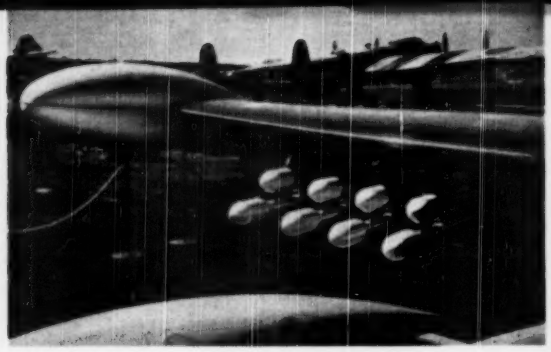
The Supermarine 535 is a *bona fide* fighter development of its forerunner, the 510, which, though potentially a fighter, was utilized solely as a high-speed, swept-wing research aircraft. Though the first 535 to fly has a centrifugal-flow Rolls-Royce Nene, installation of an axial-flow Avon of greater thrust is foreseen. Furthermore, though the four 20 mm guns of the first prototype are mounted, Attacker fashion, in the wings, in production machines they would be grouped in the fuselage nose. The internal tankage is much increased by comparison with earlier Supermarine jet

Meteor N.F.11 night fighter (two Rolls-Royce Derwents), developed by Sir W. G. Armstrong Whitworth Aircraft, Ltd., from the original Gloster design.





Nose of the Gloster Meteor P.R.10 high-altitude reconnaissance aircraft.



Tip-tank and R.P. armament on the Gloster P.V. ground-attack Meteor.

THE YIELD OF THE YEAR . . .

fighters, and, at 295 sq ft, the wing area is 22 sq ft greater than on the 510. Some revision has been made in the wing plan-form to accommodate the main components of the new (nosewheel) undercarriage and the fuselage has been extended forwards until the overall length is 42ft 11in. So nose-up is the take-off and landing attitude, due to the sharp sweep-back, that in addition to the nosewheel, small twin tailwheels are provided to afford protection for the rear fuselage.

There is no reason to doubt that the maximum speed of these new Hawker and Supermarine fighters is potentially superior to that of the North American Sabre, which, nevertheless, still defies attacks on its world record of 670.9 m.p.h., established as long ago as September 15th, 1948.

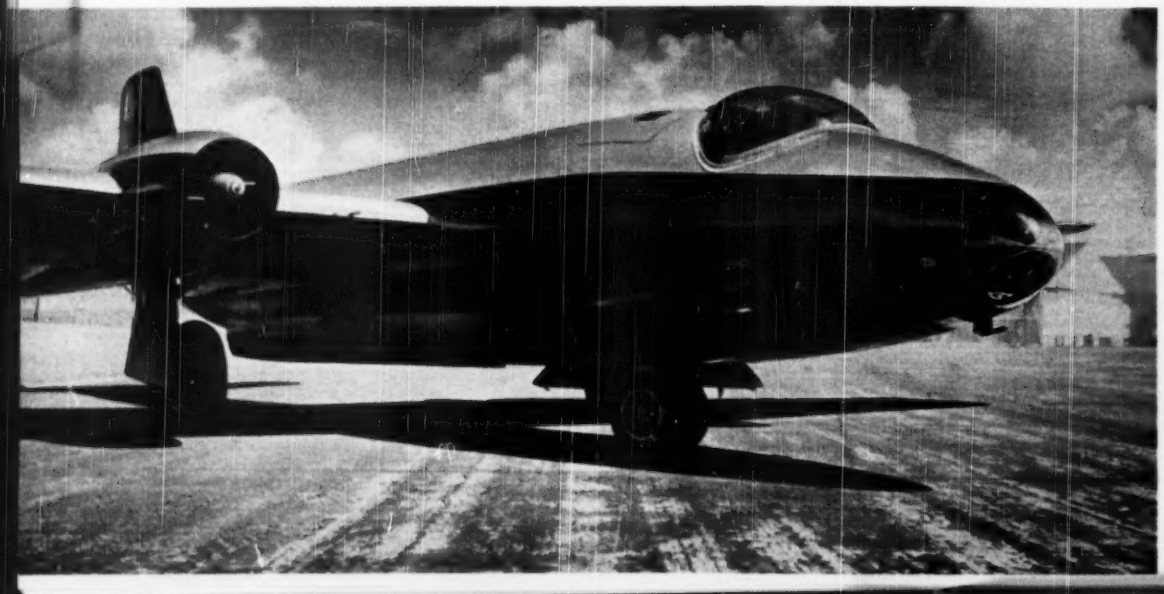
All-weather and Night Fighters.—As already intimated, the Old Country is still unable to match the tactical effectiveness of the Avro Canada CF-100 Canuck two-seater, all-weather, round-the-clock fighter, which displays some of the best qualities of the Canadian backwoodsman—endurance, the power to stalk its prey under adverse circumstances, and the ability to use its armament with maximum effect.

Though the first prototype has two Rolls-Royce Avon turbojets, Avro Orendas, of comparable output, have been installed in the second example and are specified for the production batch to be built for the R.C.A.F. The Canuck is unofficially credited with an armament of four 30 mm guns and is officially stated to carry an "unusual amount of new radar and navigation aids." Ample wing area and great available thrust confer an outstandingly high rate of climb; the span is 52ft and the length six inches greater. No more desirable all-weather fighter is known to exist, and the knowledge that the Chief of the Air Staff has stated that plans are in hand to get a Canuck over to England as quickly as possible is indeed gratifying.

Although Great Britain has no fighter directly comparable with the formidable Canadian product, the year brought the welcome news of orders for two distinct types of two-seater, radar-equipped night fighters, developed respectively from the single-seat Gloster Meteor and de Havilland Venom. Designated by the mark number N.F.11, the Meteor is the outcome of sound basic design by the parent company and ingenious adaptation by Sir W. G. Armstrong Whitworth Aircraft, Ltd. Due to the improved fineness ratio of the fuselage it is feasible that the Mach number may be fractionally higher than that of the standard F.8 single-seater fighter, as delivered to R.A.F. interceptor squadrons during the year. Compared with the F.8, the span of the N.F.11 has been increased from 37ft 2in to 43ft. Both the pilot and the radar operator have Martin-Baker ejector seats, and the four 20 mm British Hispano guns have been transferred from the fuselage to the wings.

The Venom N.F.2 night fighter has been developed along the same lines as was the D.H.113 Vampire night fighter which appeared last year. Its precursor was the Venom F.B.1, as adopted by the R.A.F. A carrier-borne version of the night fighter has been adopted by the Royal Navy in succession to the piston-engined D.H. Sea Hornet N.F.21 currently in service. The high speed and excellent handling characteristics of the Venom N.F.2 were demonstrated at the Farnborough display within a few days of the prototype's completion. Adherence to the original Mosquito side-by-side, slightly staggered seating arrangements for the pilot and radar observer won wide approval. The enlarged nose, to accommodate the crew and airborne-interception radar, necessitated redesign of the tail surfaces. The Venom's docility and simplicity should prove especially popular among Royal Naval flying, servicing and maintenance

English Electric Canberra B.2 tactical bomber, powered with two axial-flow Rolls-Royce Avons. It is now in large-scale production.



Blackburn and General Aircraft Y.B.1 carrier-borne anti-submarine aircraft, powered with an Armstrong Siddeley Double Mamba turboprop.

personnel. Boundary-layer "fences" are now standard fitments on all Venom wings.

Ground-attack Fighters.—Development of the Gloster Meteor during 1950 was not confined to the A.W. night fighter variant already mentioned; in fact, one of the most-discussed debutantes at the Farnborough display was a private-venture tactical ground-attack version of this machine, unofficially dubbed "Reaper" by reason of its formidable armament. Basically the airframe is that of the Meteor 8. Provision is made for carrying either 1,000 lb bombs; twenty-four 95 lb rocket projectiles; 580 gallons of additional fuel, in wing-tip, under-wing and ventral drop-tanks; or various combinations of these loads, in addition to the standard built-in armament of four 20 mm guns. In place of the ventral tank, or other fuselage-mounted stores, a fairing containing two extra guns (20 mm or 30 mm) can be fitted.

With rocket assistance (two RATOG bottles under the fuselage and two on the fuselage sides) the P.V. Meteor's take-off run should be sufficiently decreased to allow operation from advanced airfields even when maximum armament load is carried. Provision is made for land-type arrester gear.

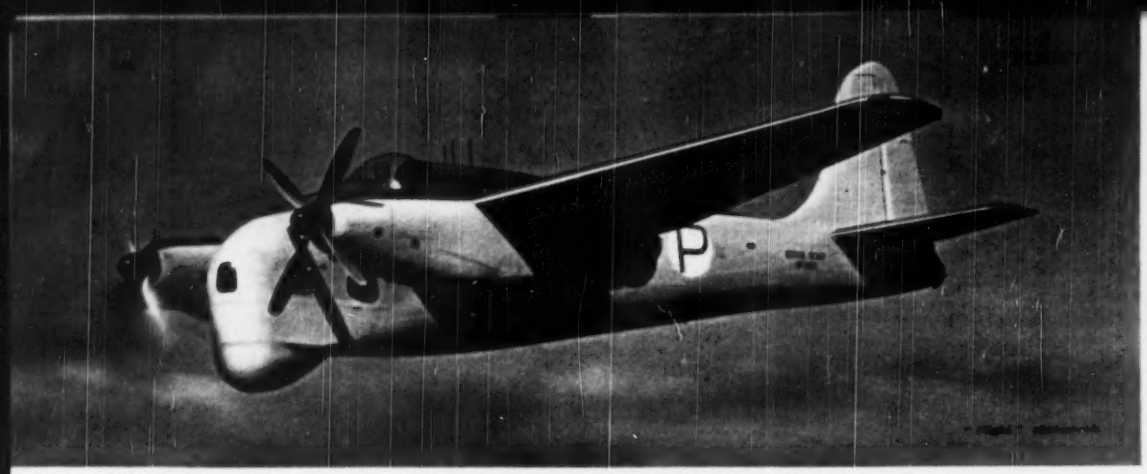
Reconnaissance Aircraft.—The Meteor's versatility was further manifested in two developments, for fighter-reconnaissance and high-altitude reconnaissance duties. The nose of the F.R.9 (fighter-reconnaissance) has a flat, downward-inclined, camera window in the extreme tip and a window on each side. The standard four 20 mm gun armament is retained. On the P.R.10 (high-altitude) version the nose arrangements are similar, but additional, downward-facing, cameras are installed in the rear fuselage. The wing-span, as on the Meteor N.F.11, has been increased to 43ft. For maximum range, ventral and wing drop-tanks are fitted.

Jet Bombers.—Though, regrettably, no jet bomber other than the English Electric Canberra was flying in Britain during 1950, the Canberra appeared in a new guise—as a tactical, three-seater, under the designation Canberra B.2. This version, the first chosen to go into service with the R.A.F., differs from the Mk. 1 in having a transparent nose fairing and a window on the port side. During the year the Canberra made its first appearance with wing-tip tanks. Several examples are already flying and deliveries to squadrons should be well under way early in the new year.

Towards the year's end it was intimated that Canberras are to be built not only by English Electric but by Avro, Handley Page and Short Brothers and Harland.

Carrier-based Anti-submarine Aircraft.—A sharply contested series of comparative trials was being conducted during the year with three types of aircraft answering Naval requirements formulated in the G.R.17 specification. This called for a deck-landing, anti-submarine machine of the

Fairey 17 (Double Mamba), built to the same specification as the Blackburn machine illustrated above. The pictures are directly comparable



Short S.B.3 carrier-borne anti-submarine aircraft, with two Armstrong Siddeley Mamba turboprops—a development of the piston-engined Sturgeon.

THE YIELD OF THE YEAR . . .

class termed by the Americans "single-packet," by virtue of its ready adaptability for either the search or the strike role. The types concerned were the Fairey 17 and the Blackburn Y.A.5 and Y.B.1. Shortly before the Farnborough display the Short S.B.3, intended for similar duties, made its appearance.

Although the first prototype of the Fairey 17 flew in 1949 (September 19th), most of the development work has been undertaken this year. During June initial deck-flying trials were in progress aboard H.M.S. *Illustrious* and the splendid total of 27 landings and take-offs was recorded in one day. The initial landing was historic, being the first by a turboprop aircraft aboard a carrier.

In common with the Blackburn Y.B.1 the Fairey 17 is fitted with an Armstrong Siddeley Double Mamba turboprop, consisting of two Mambas placed side by side and each driving one of two contra-rotating co-axial airscrews. As applied to a carrier-borne aircraft an important advantage of such a unit (additional to its virtues of low weight and compactness) is that for economical cruising, either of the Mambas can be shut down and its airscrew feathered. Another significant merit of this arrangement is that maintenance is reduced, since for much of its flying life only one half of the power unit is in use.

Being seated very far forward, above the engine, the pilot has an excellent field of view. A model displayed at Farnborough embodied a new type of two-seat cockpit enclosure for two other crewmen. Anti-submarine armament stores, certain of them still of a secret nature, are stowed in the remarkably capacious bomb bay, and provision is made for sonobuoys and other military equipment under the wings.

An ingenious "double fold," with mechanical operation, has enabled the height of the aircraft, with wings folded, to be kept down to 13ft 9in—a mere half-inch greater than the "spread" height.

Structurally the "17" is of exceptional interest in being the first aircraft to be built under the new, patented, envelope jigging system in which the structure is built from the skin inwards.

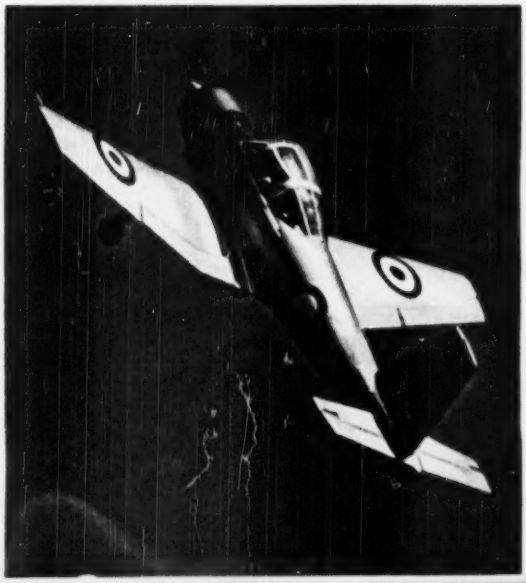
The piston-engined (Rolls-Royce Griffon) Blackburn Y.A.5 and its turboprop development, the Y.B.1, with Armstrong Siddeley Double Mamba, are very closely related and the following brief chronology of development is interesting: Y.A.5 initial flight, September 20th, 1949; first Y.A.5 landed on H.M.S. *Illustrious*, February 8th, 1950; second prototype Y.A.5 initial flight (3-seater), May 3rd, 1950; second prototype landed aboard H.M.S. *Illustrious*, June 19th, 1950; first Y.B.1 initial flight, July 19th, 1950. During recent weeks the Y.B.1, in turn, has completed its deck trials, and in fourteen months the sum total of trials with the three prototypes is over 1,000 landings and more than 300 hours' flying.

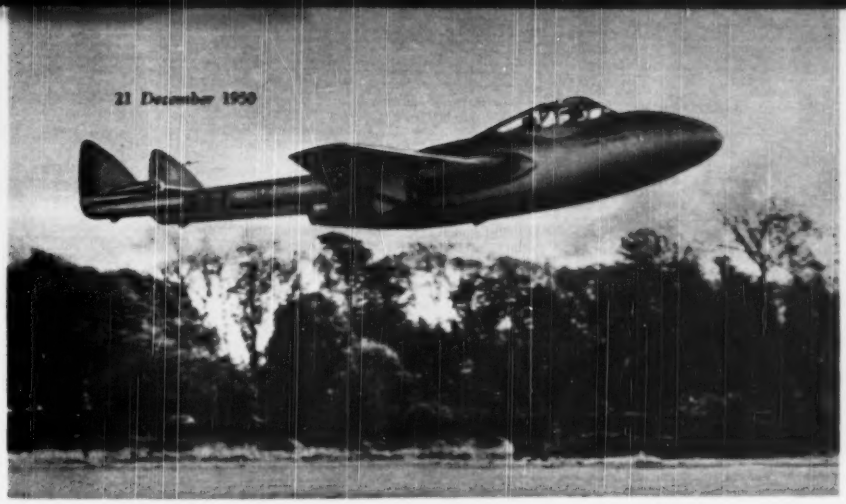
In none of the new Naval anti-submarine aircraft now on test is there evidence of any defensive or offensive gun armament, though in the Fairey and Blackburn machines internal capacity for offensive anti-submarine weapons seems very great indeed, considering the modest dimensions of the aircraft. Though not readily visible in its retracted position, the radar housing in the rear fuselage is of substantial proportions. It is generally known that the radar range of an aircraft is considerably wider than that from a surface vessel and, of course, is greatly increased by the aircraft's speed and mobility; but it is not always appreciated that, due to the height of the aircraft, the radar beam is steeper and enables a schnorkel breathing device to be detected in conditions under which the flat beam from a surface vessel would be ineffective.

Since the Y.B.1 made its initial appearance at the S.B.A.C. display over 50 hours' flying has been logged with this prototype alone and, as a result of experience gained, extended wing-tips have been embodied. The makers state that the resulting increase in aspect ratio is beneficial in reducing induced drag in the highly important single-engine cruising case. To restrict the "folded" height to the limits imposed by a carrier's hangar the new wing-tips are arranged to fold, Seafire-fashion.

Developed from the Short Sturgeon T.T.2 carrier-borne target tug and photographic spotter (in its turn derived from the Sturgeon 1 bomber-reconnaissance type), the Short S.B.3 is of special interest in that the power is of the same order as that available in the Fairey 17 and Blackburn Y.B.1, but is derived from two individual Mamba units instead of a Double Mamba. The high monoplane wing

Handley Page (Reading) H.P.R.2 trainer (A.S. Cheetah or Alvis Leonides).





The world's first side-by-side-seater jet trainer, the D.H.115 Vampire, adapted by Airspeed, is remarkably roomy, the cockpit being wider than that of the twin-engined Oxford.

(except for the deletion of the coolant radiators in the centre-section panels) appears to be a direct inheritance from the Sturgeon but the fuselage differs greatly at its forward end. Especially remarkable is the pendulous—almost elephantine—appearance, occasioned by the radar housing under the observer's very deep cabin in the extreme forward end.

Observers at Farnborough noted that the power delivered to the two four-blade airscrews is not augmented by residual jet-action, the tail-pipes being turned through a right angle to eject downwards.

Until such time as new carrier-borne anti-submarine equipment becomes available Royal Naval squadrons will be mainly dependent upon versions of the Fairey Firefly to counter the underwater menace. The latest announced Firefly is the A.S. Mk. 6, an example of which was displayed at Farnborough this year. This variant differs from its predecessors only in details of equipment, but more radical adaptation of the Firefly for the exacting counter-submarine tasks foreseen appears feasible should this prove necessary, for the design is unusually adaptable.

Carrier-based Strike Aircraft.—Development and production of the Westland Wyvern T.F.2 torpedo fighter (Armstrong Siddeley Python turboprop) went ahead during the year and although no weight or performance data were forthcoming, a machine of this type was permitted to appear at Farnborough carrying a representative military load of one torpedo and sixteen 90 lb rocket projectiles in addition to its four wing-mounted 20 mm guns. A camera port was noted in the rear fuselage of this massive single-seater.

Maritime Reconnaissance Aircraft.—Several examples of the Avro Shackleton G.R.1 long-range maritime-reconnaissance aircraft (four Rolls-Royce Griffons) were amassing type-experience during the year in the hands of the contractors' and Service pilots. Additionally, announcement was made of a version of the Handley Page Hastings designated Met.1 and adapted for unarmed meteorological reconnaissance duties with the R.A.F.

Military Transports.—Quantity production of this class of aircraft was confined to the well-tried Handley Page Hastings C.2 (four Bristol Hercules 101s) and Vickers-Armstrongs Valetta C.1 (two Hercules 230s), but a significant forward step in development was recorded with the first flight of the massive Blackburn and General Aircraft G.A.L.60. This most impressive machine, powered with four Bristol Hercules engines, has received wide publicity in its proposed civil form as the "Universal Freighter," but details affecting the operational employment and equipment of the military version are withheld.

Since its first flight in June, the G.A.L.60 has flown for over 30 hours and has made 51 landings at a range of gross weights up to 90,000 lb. All who have flown in the aircraft are reported to have been impressed by its easy handling and complete freedom from vice. Tests made to date include those for longitudinal stability and control with flaps up and down, and with or without power; determination of operating forces on all three controls; and stalling. The makers are gratified by the absence of any appreciable change of trim when the throttles are opened and

In common with the H.P.R.2, the Percival P.56 is endowed with qualities which should make for popularity with trainees and ground crew alike.

The Westland Wyvern T.3 naval trainer (Armstrong Siddeley Python).

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the very small trim changes occasioned by lowering the flaps. Preliminary results indicate that stability control in all conditions are adequate for the large range of c.g. positions associated with a freight-carrying aircraft. Control forces measured in flight have been in excellent agreement with preliminary estimates. A point of special interest is that aileron hinge movements have been measured by by-passing the electrical flap synchronizing mechanism and flying level with the flaps lowered on one side only. Initial stalling tests indicate that the stall is innocuous, full lateral control being maintained, with no tendency for either wing to drop. The stall is preceded by slight buffeting and followed by a gentle dropping of the nose. Tests planned for the immediate future include trials of a main undercarriage comprising two four-wheeled bogies, and the proving of modified powered flying controls having an increased proportion of the load fed back to the pilot, the control surface hinge movements being correspondingly reduced by adjustments to their aerodynamic balances. This development will result in lighter operating forces in the event of a hydraulic power failure.

Trainers.—An official specification brought forth two basic trainers of unusual technical interest and—judging from their uninhibited performances at Farnborough—having excellent flying qualities. Designated P.56 and H.P.R.2, they are products of the Percival and Handley Page (Reading) concerns, and prototypes of each exist with Armstrong Siddeley Cheetah and Alvis Leonides engine.

Introducing the P.56, the Percival Company claimed that the experience of the R.A.F. and other air forces equipped with the earlier Prentice established conclusively that the "basic" class of trainer, typified by that machine, is the right conception. Though there is no unanimity on this point, the evidence is adduced that, on earlier types of light training aircraft, not equipped with blind-landing radio aids, etc., the maximum useful instructional time was found to be about 60 hours, leaving some 140 hours for the advanced stage. With the Prentice, it is stated, the ratio was changed to 100 hours in each case, and it is believed that the P.56 should be able to undertake an even greater share of the syllabus, leaving to the costlier "applied" trainers only a short conversion stage.

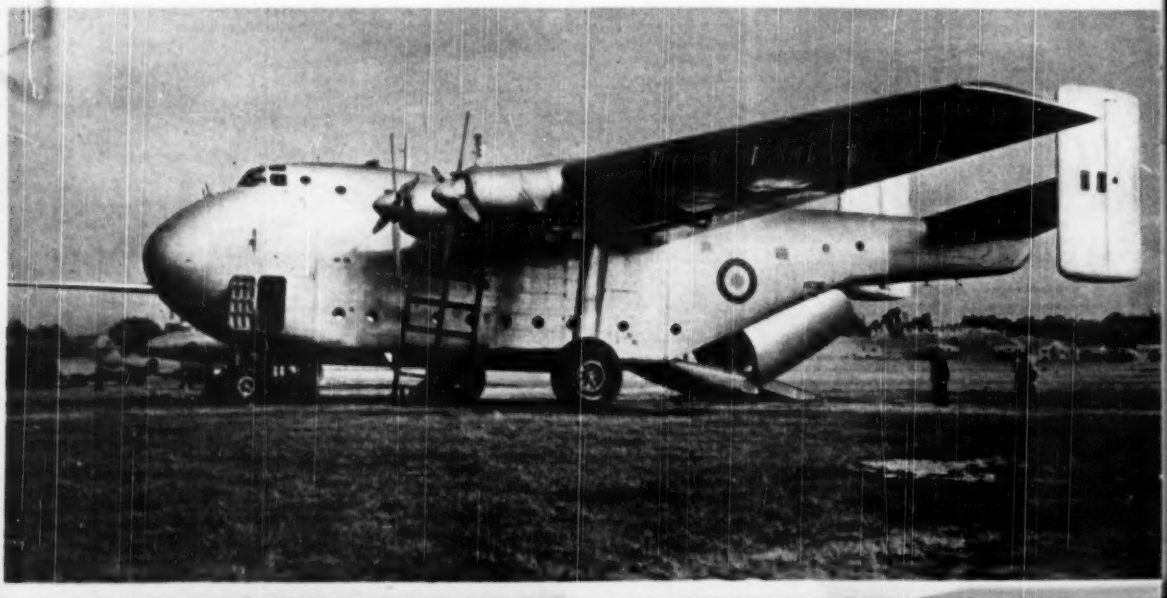
Of all-metal construction, the P.56 has a roomy cockpit with side-by-side seats and full dual controls, including duplicate handwheels for elevator and rudder trimming tabs, throttles and airscrew pitch-control levers. The semi-monocoque fuselage has large hinged panels, affording ready access to the radio, accumulators and other internal equipment. Slotted flaps and detachable tips characterize the stressed-skin wings, and the fixed undercarriage incorporates oleo-pneumatic struts and pneumatically operated brakes.

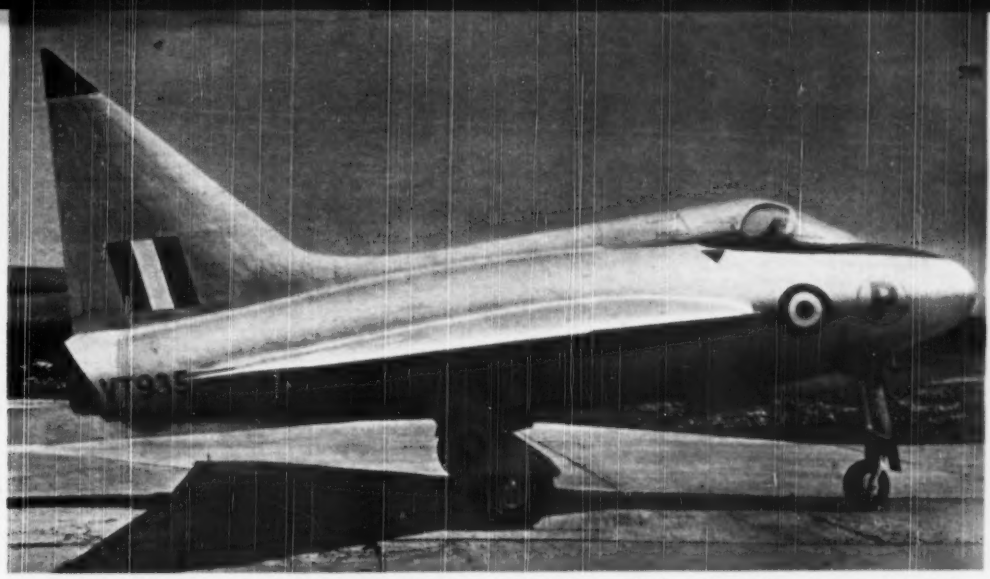
So far in this survey it has not been possible, due to security restrictions, to quote performance and other quantitative data for Britain's new military aircraft. Trainers are happily exempt and the following figures are illustrative of the quality of Percival's new trainer, as powered by an Armstrong Siddeley Cheetah engine: gross weight, 4,050 lb; take-off to 50ft, 421 yards; rate of climb from sea level to 2,500ft (take-off power), 1,400ft/min; max. speed at 2,500ft, 178 m.p.h.; economical cruising speed at 2,500ft, 145 m.p.h.; service ceiling, 17,600ft.

The H.P.R.2 is likewise of metal construction and is designed for fast production by the use of split-construction methods, allowing maximum man-power to be concentrated simultaneously on many assembly jigs. The splitting of the airframe into numerous components greatly facilitates maintenance and replacement of damaged parts. The cockpit is enclosed by an electrically operated canopy, affording an excellent all-round view, and all controls are readily accessible from the two seats. The entire cockpit can be inspected and maintained from the ground through large floor panels. It was announced at Farnborough that the H.P.R.2 can be powered by any one of the 400-600 h.p. range of piston engines, and flying trials are now in progress with the 420 h.p. Armstrong Siddeley Cheetah 18 and 550 h.p. Alvis Leonides 502/4. The following figures apply to the Cheetah-powered version: top speed at 2,500ft, 173 m.p.h.; endurance at max. weak-mixture power (normal fuel), 2.48 hr; climb to 5,000ft, 5 min; take-off distance to 50ft, 450 yards.

The introduction at Farnborough of the Vampire jet trainer (D.H.115) was a not wholly unexpected, and alto-

An account of highly encouraging trials with the Blackburn and General Aircraft G.A.L.60 military freighter, seen here, is given in the text.





Powered by a Rolls-Royce Nene, the delta-wing Boulton Paul P.111 has been built for the study of aerodynamic phenomena at very high speeds.

gether most welcome, event. Trials in recent weeks suggest that the makers' confidence in the success of this type is well founded. Special credit is due to the Airspeed Company (an associate company in the de Havilland Enterprise) for such a successful adaptation of the standard Vampire airframe to provide for full dual control, dual instrumentation and side-by-side seats.

At shoulder level the cockpit is 44in wide—1in wider, in fact, that that of the Airspeed Oxford and 6in wider than that of the Mosquito. This has necessitated an entirely new form of canopy, the framework of which is of welded tube, with glazing flats welded on. On each side of the large single-piece optically correct front screen are flanking direct-vision panels. Access is gained through the roof panel, which is hinged at the rear centre point and is locked by a pair of turn-buttons on each side. For emergency jettisoning a small hydraulic jack is embodied inside the hood. Primary flight instruments are fully duplicated and are embodied on a single panel spanning the cockpit, with the engine and auxiliary-service instruments occupying the centre area.

Not only should the D.H.115 prove an eminently suitable type for advanced training and jet conversion, but it has full provision for instruction in gunnery, rocket-firing, bombing, and fighter navigation. Deck-landing training is another possible application, though the prototype does not carry the necessary equipment.

Detailed performance figures released on the introduction of the Trainer are illuminating not only in respect of the variant itself but of the whole Vampire range. The operational ceiling of 40,000ft can be reached in 16.3 min. Maximum level speed is 467 knots at sea level and 452 knots at 40,000ft. At a Mach number of 0.7, at 40,000ft (395 kt), the radius of steady turn is 1.95 nautical miles. At the same speed and altitude, the aircraft can achieve a minimum radius of turn of 0.95 n.m. At lower altitudes, these figures will naturally be considerably improved. The endurance at altitude with allowances for take-off, climb and descent, is approximately two hours without drop tanks and three hours with. Without drop tanks, the aircraft has a still-air range of 730 n.m. at 30,000ft, and 345 n.m. at sea level. With drop tanks, the corresponding figures are 1,080 n.m. and 540 n.m.

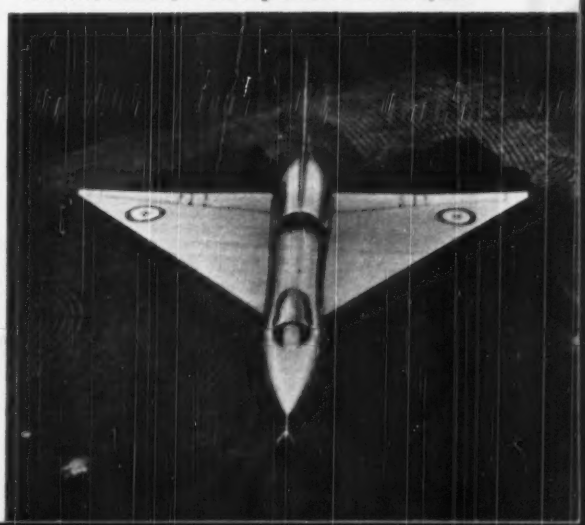
As this report was being written it was learned that the Vampire Trainer, after two or three hours of flying (to establish that the handling characteristics were satisfactory and to conduct a few preliminary stability and loading tests), had gone back into the shops for the installation of pressurization equipment and for final static tests of the new canopy, with its jettisonable roof. It was due to fly again shortly and its tactical evaluation was to follow, with special reference to the side-by-side seating arrangements for rocket, bombing and gunnery training.

To afford facilities for naval pilots to train with operational weapons, the Westland Wyvern T.3 trainer was developed during the year from the T.F.2 torpedo fighter. Similarly powered with an Armstrong Siddeley Python turboprop, the T.3 differs in having a second cockpit, with duplicated controls aft of the normal T.F.2-type cockpit. Front and rear canopies can be opened independently and each cockpit has a Martin-Baker ejector seat. Though it is claimed that vision from the rear cockpit is very little impeded by the forward canopy and seat back, a periscopic mirror is built into a streamline fairing mounted between the two enclosures. Thus, the instructor, who normally occupies the rear seat, can see clearly ahead and downwards at a relatively steep angle. The Wyvern being a deck-landing aircraft, this is a matter of great importance.

Except for the modified rear fuselage, all major structural units are interchangeable between the two marks of Wyvern.

A trainer totally different in character from those already reviewed, but of a class in which a great deal of interest is current, is the Vickers Valetta T.3 "flying classroom." This machine is not to be confused with the Varsity crew trainer, introduced last year and now in small-scale production for the R.A.F. Unlike the Varsity, it retains the tail-down undercarriage of the Valetta military transport, which it resembles, in fact, other than in equipment.

Avro 707B, intended for delta-wing studies at moderate speeds.



Vickers-Armstrongs Tay-Viscount research aircraft (see Rolls-Royce Tay turbojet).

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Externally, the new "classroom" is distinguished by no fewer than six astrodomes. The crew numbers four and there is provision for 10 trainees and two instructors.

Research.—It is especially gratifying to be able to record this year some very important additions to Britain's range of aircraft for aerodynamic research, exploratory high-altitude flying and power-plant development. Two are delta-winged, though one of these—the Avro 707B—is not strictly a "1950" type, being a development of the original 707 which first flew in September, 1949, and was subsequently destroyed in an accident. The 707B made its appearance at Farnborough this year on the day of its first flight. Especially dramatic was the pilot's unannounced use of the tail parachute as a landing brake.

Being intended for research at relatively low speeds, the 707B is not abnormally powerful; the turbojet is, in fact, a Rolls-Royce Derwent of some 3,500 lb static thrust fed from an intake saddling the fuselage. By comparison with the first 707 the nose has been lengthened, the cockpit enclosure redesigned and the tail surfaces revised.

Totally new is Boulton Paul's P.111, powered by a single Rolls-Royce Nene of 5,000 lb thrust or more, and intended for aerodynamic research at higher speeds than are attainable by the Avro 707B. The span is 33ft 6in, length 26ft 1in, height (over the unusual triangular fin) 12ft 6½in, and undercarriage track 14ft 5in. The fuselage is elliptical in section and at its extreme forward end is an elliptical intake for the turbojet. Photographs show bifurcation a short distance inside the intake throat. Interconnecting the cockpit enclosure and fin is a form of spine. On the port side, far aft, there is a prominent fairing for a tail parachute. The wing (on the first example, at least) has almost pointed tips and appears to be of thinner section than the wing of the 707B.

American sources have announced a third British delta, constructed by the Fairey Company, and in this connection it may be remarked that at the annual general meeting of the Fairey Aviation Co. this year reference was made to the completion of a prototype designed for experiment in "new and revolutionary possibilities." To date, only one delta-wing machine—the Convair XF-92A—has flown in America.

The purpose underlying the development of the Avro

Built and equipped for sustained flight at heights of 40,000ft and above, the Avro Ashton is powered by four Rolls-Royce Nene turbojets.

Ashton jet-propelled, high-altitude research aircraft, which made its first appearance at the S.B.A.C. Display, has been summarized by Sir Roy Dobson, C.B.E., a director of the Hawker Siddeley Group and head of A. V. Roe, in the following terms: "Hitherto, high-altitude research has been confined mainly to small aircraft of fighter size in which it was impossible to install and inspect all the complicated flight reporting instruments. Free movement was hindered by the necessity of wearing oxygen masks. The Ashton is a flying laboratory big enough to hold all the instruments we require, and the pressurized cabin makes it possible for the engineers to stay aloft for long periods in comfort. With an aircraft organization such as the Hawker Siddeley Group, which is producing every type and description of aircraft, it is most important that we have an aircraft like the Ashton to seek out the problems which will determine future design trends."

Six Ashtons, including the prototype, have been ordered by the Ministry of Supply. These aircraft will normally operate with a crew made up of a captain, first officer or co-pilot, flight engineer, navigator and radio operator.

All three units of the nosewheel undercarriage have twin wheels and each unit retracts forwards, the nosewheel into an unpressurized section of the fuselage nose and the main wheels into the turbojet nacelles. A high degree of ground manœuvrability is afforded by nosewheel steering: the maximum steering angle is 35 deg on each side, and beyond this range castor action is obtained up to 170 deg each side.

Attached to each centre-plane is a massive nacelle housing two Rolls-Royce Nene turbojets. A large detachable cowling at the front forms a common air intake and the thrust outlet is in the form of individual jet-pipes passing below the wing spars and terminating aft of the trailing edge. A longitudinal fireproof diaphragm attached to the firewall separates the Nenes of each pair.

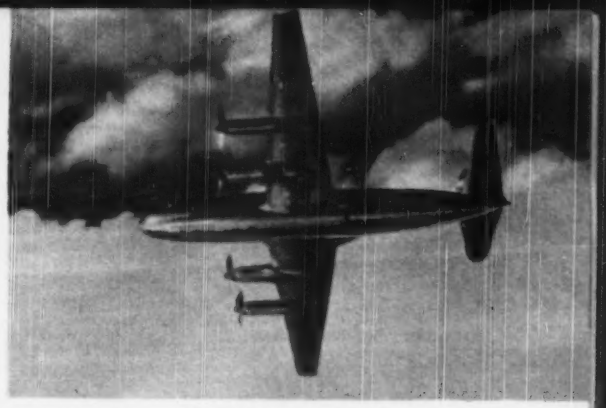
The cabin air-conditioning system comprises four superchargers (each pair driven by an auxiliaries gear box) which deliver outside air to the fuselage *via* coolers, silencers and controllable spill-valves. The conditioned air is distributed throughout the cabin through under-floor and roof ducting. Heat generated in the superchargers is used to warm the cabin and is controllable by throttle valves. Pressure regulation is by a discharge valve which opens and closes automatically to release pressure to atmosphere. Thus, internal pressure can be set to remain constant at a predetermined figure. Air circulation within the cabin is assisted by an electrically driven fan.

Taking up the threads, as it were, where they were dropped by the Vickers-Armstrongs Nene-Viking is the Tay-Viscount, by the same makers. As its name indicates, this is powered with two Rolls-Royce Tay centrifugal-flow turbojets of 6,250 lb apiece. The second Viscount to be completed, it is shorter than that of the production-type Viscount 700 later referred to, and serves not only for the testing of the Tay (not quantity-produced in this country, as in America) but for exploratory high-altitude flying under all conditions. Late in November it was announced that the aircraft had completed twenty-five flying hours mainly on flight handling trials. Certain experimental equipment was then being installed.

Among the power-plant-development aircraft of the year the Meteor 8, with two Armstrong Siddeley Sapphires, and the Mk. 4, with two late-model Rolls-Royce Avons, are outstanding. A height of 40,000ft is easily attained in three minutes or so by these machines. So great is the thrust that on a full-power take-off the nose must be sharply pulled up immediately the wheels have left the runway; otherwise the "wheels-up" speed is exceeded.

To the long series of Avro bombers adapted for power-plant testing were added the Proteus-Lincoln (two Bristol Proteus turboprops outboard of two Merlins) and the "Reheat" Lincoln (four Merlins retained but one Rolls-Royce Derwent underslung, for afterburning experiments). Another Lincoln has rendered excellent service during the year in the role of tanker for "probe and drogue" refuelling experiments with the Meteor and other jet fighters.

Two Sapphire turbojets have been installed not only in an Avro Lancastrian but in a Handley Page Hastings also. The vast thrust of the Sapphires was manifest on the initial flight of the adapted Hastings, when this massive machine reached 1,000ft in about 30 seconds from take-off.



Vickers Viscount 700 (four Rolls-Royce Dart turboprops)

New double-slotted flaps characterize the second prototype of the Handley Page Hermes V, fitted with four Bristol Theseus turboprops.

The Armstrong Whitworth Apollo (four Armstrong Siddeley Mamba turboprops) as it appeared taking off at the 1950 S.B.A.C. Display.

Civil Transport Aircraft.—Within the past few days announcement has been made of over 8,000 engine hours (the equivalent of nearly a year's continuous flying) by British turbine-powered airliners. A quarter of this total has been made up by the two pure-jet de Havilland Comets, the rest by four turboprop machines—the two Vickers-Armstrongs Viscounts, the Armstrong Whitworth Apollo, the Handley Page Hermes V, and the Handley Page (Reading) Marathon 2. It must be emphasized that only prototype *airliners* are included in this reckoning; no account is taken of the numerous engine-development machines and research aircraft, such as the Avro Ashton and Vickers-Armstrongs Tay-Viscount.

Throughout the year the Centaurus-engined Bristol Brabazon I was seen over several districts, and by the year's end will have over 160 hours' flying. Construction of the Brabazon II, Saunders-Roe Princess flying boat and Bristol 175—all to have Proteus turboprops—went ahead.

Development flying during the year by the first and second Comet prototypes brought the total flying time on this type to over 480 hours. The second Comet, which first flew in July, is actually the first production aircraft. It differs from the prototype in having the elevator and rudder mass-balances suppressed into the structure, in having suppressed aerials

de Havilland Heron (four D.H. Gipsy Queen 30s).

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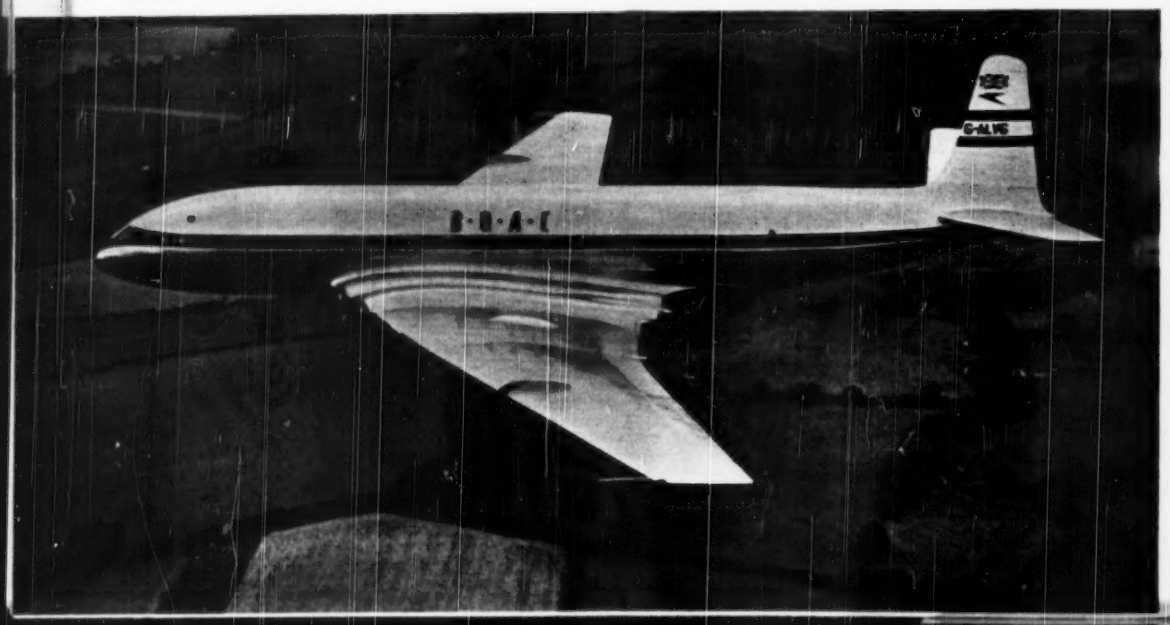
for the radio and radar, and in being fitted with the full de-icing system, using hot air tapped from the compressors of the Ghost turbojets. The 80-odd hours of flying since the first flight have been largely spent in testing the installations named above, and it is expected that the work in hand will be completed before the aircraft (which, at the time of writing, is being upholstered and furnished) is loaned to B.O.A.C. early in the New Year for route trials.

The third Comet—the first of the B.O.A.C. fleet of 14, and the first to be fitted permanently with the multi-wheel bogie undercarriage—emerged from the production hangar on November 17th for fuel tank calibrations and engine runs. At the time of writing the first flight is imminent. This machine will be delivered to B.O.A.C. about the middle of 1951, and will be followed by others which should permit of public operation by Comets before the end of 1951.

Announcement was made during the year of the intention to develop a "Phase 2" Comet with Rolls-Royce Avon or Armstrong Siddeley Sapphire axial-flow turbojets. In the development of this type emphasis would be placed on range, and such a machine would be able to fly the North Atlantic—on occasions direct—without recourse to flight refuelling.

In Canada, work went ahead on the four-Derwent Avro Canada C-102 Jetliner, and by June more than 100 hours' test-flying had been completed. Level speeds of more than 500 m.p.h. have been attained during the year, and the cruising speed has been established as 450 m.p.h. A height of 39,500ft—9,500ft higher than the normal cruising height—has been attained. Many three-engined take-offs have been made at various speeds and at maximum gross weight. On a number of occasions the aircraft has been flown, with only one of its four Rolls-Royce Derwents operating, at about 200 m.p.h., with no loss of height observed. Several test flights were made over a triangular course of about 800 miles, and the average time was about two hours. These flights were made at normal cruising height and showed that about 1,600 Imperial gallons of fuel had been used. The production version of the Jetliner will have a fuel capacity

Resplendent in its B.O.A.C. colours, the de Havilland Comet (four D.H. Ghost turbojets) is glimpsed on its way to the S.B.A.C. Display in September.



PROGRESS

Rolls-Royce produce turbo-jet,
propeller-turbine and piston aero engines to suit
all types of medium and high-powered aircraft

THE HAWKER "SEA HAWK" NAVAL FIGHTER
powered by the Rolls-Royce "Nene" turbo-jet engine

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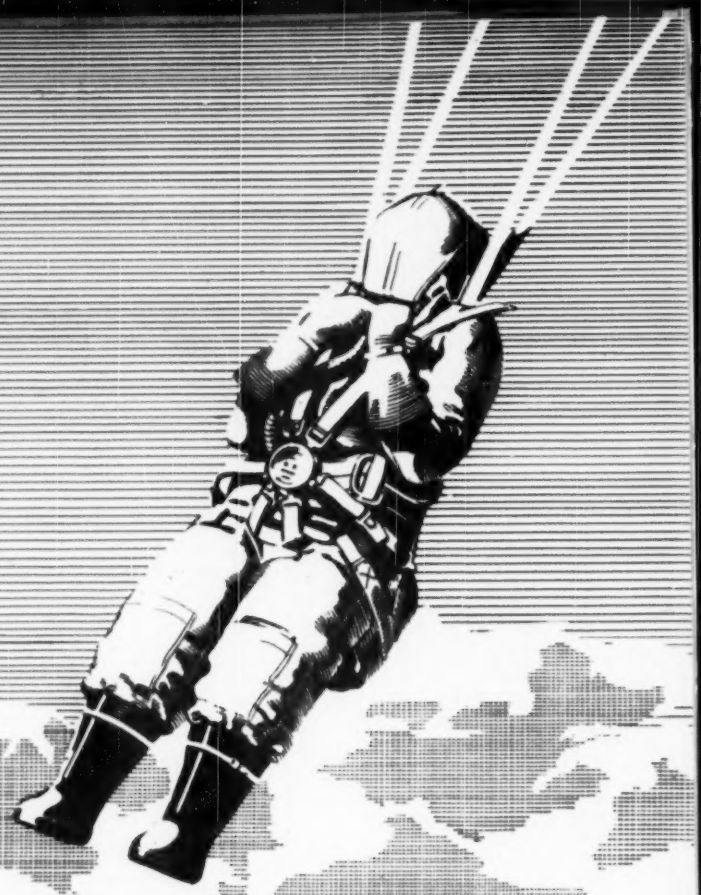


The MARTIN-BAKER PATENT AUTOMATIC EJECTION SEAT is the result of nearly six years of intensive research and development work.

The seat is fitted with barostatically controlled automatic opening parachute and automatic harness release, combined parachute and seat harness, manual over-ride and all those features which experience has proved to be essential.

Patents applied for in all the principal countries of the world.

of 3,330 Imperial gallons. One flight of over 1,100 miles has been made during the year.

The first Vickers Viscount 700 had completed about 50 hours' flying by November. This model is longer and of broader span than the prototype Viscount, accommodates 40-53 passengers, and is designed to take advantage of the Rolls-Royce Dart RDa3 turboprops. A preliminary survey was made of the performance and handling qualities, and estimates were confirmed. After the first 50-hour inspection, trials were to be resumed with a view to obtaining a Certificate of Airworthiness.

A second prototype of the Bristol Theseus-powered Handley Page Hermes V flew in August. This machine has double-slotted flaps, giving a greatly improved take-off and landing performance, and the ability to operate at an increased all-up weight of 90,000lb. After the S.B.A.C. Display the aircraft was engaged in demonstration flying to interested operators, and in an extensive programme of flying to determine C.L. max. and stalling speeds (both with the double-slotted flap and with the two sections of the flap locked, for comparison); for airscrew development, involving D.H. Standard, Rotol wide-blade and D.H. wide-blade airscrews; and thermal de-icing tests. Certificate of Airworthiness trials were also in progress.

Of the Armstrong Whitworth Apollo (four Armstrong Siddeley Mamba turboprops) it is reported that some 200 hours of flight-testing and development work has given gratifying results. Three examples of the piston-engined (twin Bristol Centaurus) Airspeed Ambassador had amassed over 1,000 hours' flying time by October, and the type will enter B.E.A. service in 1951. An especially interesting Bristol Freighter development was the adaptation of this type to take three fertilizer hoppers having a total capacity of six tons. Versions of the Freighter introduced in 1950 have a dorsal fin.

A notable advance in the feederliner class was the introduction of the de Havilland Heron, which has been described as a "double Dove" and is powered with four unsupercharged Gipsy Queen engines. Fourteen seats are normal, and the undercarriage is fixed. Since its first flight in May, the Heron has accumulated nearly 200 hours of flying. The performance measurement programme has been completed and the results, reduced to I.C.A.N. conditions, have been found to accord closely with estimates. On November 25th the Heron left for Africa for a programme of combined performance and engine-cooling test flights under tropical conditions at Khartoum and Nairobi. Combined with the performance measurements (and, incidentally, making the utmost of each test flight during a summer of poor flying weather), a full programme of engine performance, consumption and cooling tests has been satisfactorily completed at Hatfield. Since the S.B.A.C. Display the tailplane has been given dihedral to lift the elevator horn balances clear of the slipstream.

The simple conception of the Heron has resulted in remarkably trouble-free servicing. The one unusual feature—the single-lever throttle and r.p.m. control—is reported to have justified the considerable amount of test-bed work which preceded its installation. De Havilland and A.R.B. pilots are well satisfied with this simpler and more positive method of engine power control. In a sense, the Heron was a well-developed aircraft from the outset, and flight-testing has established its full conformity with A.R.B. and I.C.A.O. requirements, its exceptional take-off and three-engine performance, simplicity and economy. Plans are well advanced for route trials during 1951, and operators who have in the past been obliged to choose between small aircraft operated from near-at-hand but small airfields, and larger aircraft operated from large but distant airfields, are interested in the prospect of operating a medium-size feederliner from the smallest airports. As the makers put it, "The choice need no longer be between an overworked Rapide and a half-empty Dakota."

Aerial top-dressing by a Bristol Type 170 freighter.

Unique among light transport aircraft was the new 4-5-seat Scottish Aviation Prestwick Pioneer, with Alvis Leonides engine, which first flew in June. This machine has now completed all test flying for its C. of A., but is carrying out some additional flights to check its suitability for use in Australia in the high temperatures existing at times on the Ministry of Supply rocket range. To date it has completed 60 flying hours. One airframe will be fitted with a Pratt and Whitney Wasp Junior, as there is considered to be a potential market for the aircraft so powered. By increasing the structure weight by about 35lb, it is possible to raise the all-up weight from 5,400lb to about 5,800lb.

Light Aircraft.—There were few developments in respect of British light aircraft, but the new Auster Aiglet made a deep impression at the S.B.A.C. Display. This is a 3-4-seater, with Gipsy Major engine, and the majority of Aiglets so far produced have been sent to Australia and New Zealand. Some Aiglets are being fitted with a 13½-gallon extra fuel tank, and one or two have a double rear seat incorporating a blistered canopy to give increased headroom. The type has also been equipped for crop-dusting and crop-spraying, and approval has been given for modification to convert the aircraft from the normal to the semi-aerobatic category.

The twin-engined Miles Aries (two Cirrus Major IIIs) had reached the engine-run stage during October, but the first flight had not been reported as this account went to press.

Scottish Aviation Prestwick Pioneer five-seater (Alvis Leonides).

Auster Aiglet three-seater (D.H. Gipsy Major), introduced during 1950.

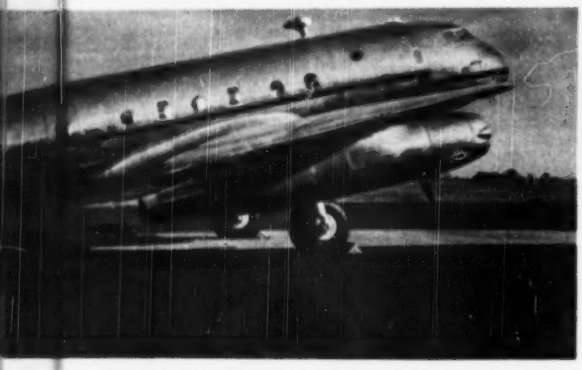
THE YIELD OF THE YEAR . .

(Continued from page 595)

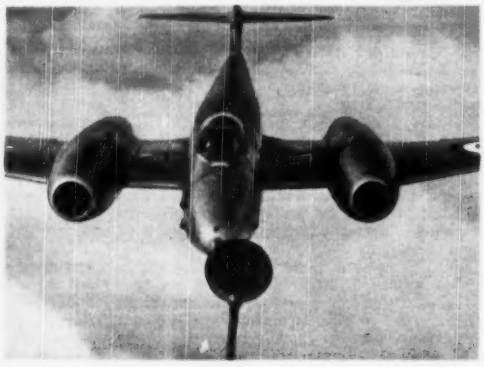
Gloster Meteor 8 fitted experimentally with two Armstrong Siddeley Sapphire axial-flow turbojets : the rate of climb is phenomenal.

Vickers-Armstrongs Valetta T.3 "flying classroom," with Bristol Hercules 230 engines. Note the row of six astrodromes atop the fuselage.

Bristol Proteus turboprop units are installed in the outboard positions of this Avro Lincoln—one of many aircraft of the type used for power-plant development-flying. Lancasters and Lancastrians are also used.

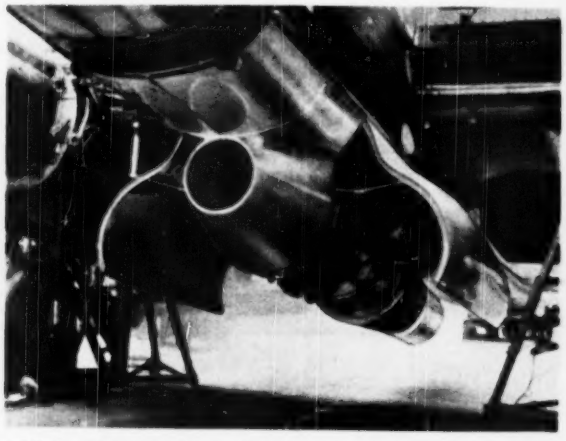


Handley Page Hastings used for development-flying, with two Armstrong Siddeley Sapphires outboard. A Lancastrian is also flying with Sapphires.



The probe-and-drogue method of Flight Refuelling, demonstrated by a Gloster Meteor 4 interceptor fighter and an Avro Lincoln tanker.

Compared with preceding marks, the Leonides-powered Bristol 171 Mk. 3 helicopter (alias the Sycamore) has a redesigned cabin, seating five.



A Rolls-Royce Derwent turbojet, with afterburner, mounted beneath the fuselage of an Avro Lincoln. This, and similar experimental installations, was made by Air Service Training.

The Percival Prince fitted with Alvis Leonides engines

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THE PRECIPITOUS PILKINGTON

A Christmas Ordeal

THE snow-wind gusted petulantly round Thames House, whisking typists homewards and deflecting Reginald Pilkington, A.R.Ae.S., into the private bar of "The Viscount Hastings." Like the good boffin he was, Pilkington knew his de-icing routine and ordered accordingly.

A thermal influence (which, of course, he recognized as being quite illusory) was beginning to induce a glowing retrospection of Christmases Past and mellow contemplation of Christmas Imminent when the swing doors jarred, giving reluctant admittance to a chilling flurry and an ageing male figure near-mummified in mufflers. The portentous de-cocooning which proceeded before foot was set to rail or elbow to bar disclosed an advanced state of boffinhood, and Pilkington was not slow to recognize, and greet with becoming deference, the person of Dr. R. A. Longbottom, F.R.Ae.S.

In immediately associating the name with that masterly monograph of the early twenties, treating of *The Predisposition to Summary Disintegration of the Pawit Fighting Scout* (H.M.S.O., 1s 4d net), the reader is, of course, correct. But he is unlikely to be aware of the patriarchal status of Dr. Longbottom to-day, in those official circles wherein—in a manner of speaking—he moves.

On the Christmas Eve of which we write, however, the sage was disposed to benevolence—even, it was evident, to a little seemly jocularity; for, cocking a twinkling eye and a lightly siphoned glass, he accorded his youthful inferior a "Cheerio" of quite Dickensian warmth.

Pilkington flushed under the unprecedented compliment; but so circumspect was his "Merry Christmas to you, sir," that the respected doctor was at once reassured of the young man's fitness to hear a few select reminiscences. As we are aware, it was Christmas Eve.

"I may say," he confided, "that I dropped in here not only for a little er—seasonal cheer, but because I happened to recall to-day that it is just thirty-two years since I undertook my first major technical investigation."

"*Really*, sir," the attentive youth enthused, "how very remarkable."

"Yes" (the inevitable anecdote was about to unfold), "it was a study of the suitability of the Vampire for ground-attack duties."

Pilkington exhaled with painful suddenness into his glass. "I *beg* your pardon, sir, but I had understood you to say you were speaking of er—some years ago."

"Thirty-two." The reaffirmation was prompt.

"But, of course, sir," said Pilkington, emboldened at having sensed some coincidence of nomenclature, "it wasn't—shall we say—a Vampire F.B.5." Sure of his ground, he ventured a titter.

"The numerical suffix," the sage announced with dignity, "eludes me, but I am disposed to believe that it was a modified F.B.26. The Vampire, as you must be aware, was of late war-time design. It preceded the Venom by some years."

This irrefutable affirmation persuaded the youth that his chief erred not so much in fact as in time. But, on Christmas Eve, who among us is entirely guiltless of such error?

Consoled and reassured, Pilkington collected himself for the dissertation he sensed to be imminent.

"I consider myself fortunate" (it came) "in having for my personal transport, some thirty years ago, a Dove. Touring the country in this altogether delightful vehicle I was able to attend a number of significant trials. They included flotation tests with a Cork, spinning tests with a Spider, speed trials with a Snail—this type, of course, featured shell-type construction—and rolling tests with a Ball."

Pilkington groaned inwardly, surmising, in the uncharitable way of youth, that stability trials of a Tipsy had probably been his chief's most recent preoccupation.

"I gave much thought to adapting the Avro 504 to take a Python engine," continued the professor after refreshment, "and I had some exciting and profitable experiences taxying a Vickers Viking in rough seas. After examining the hull, spars and rigging of the Cutty Sark at Cowes, I was offered a trip home on a Cloud. But," he added ruefully, "I had already booked my passage to Farnborough by Ferry."

By this time the devastated Pilkington was in no doubt that the doctor was either seasonally bemused or that the sustained intensity of his studies had at last told upon him. A tactful and prompt withdrawal was the obvious move, and, muttering some apology involving the 7.12 from Waterloo, he wriggled into his coat.

The doctor, however, was well away into the brave days of old. "To my mind," he mused, "one of the most significant landmarks in the development of British bombing aircraft was Courtenay's performance on the Bugle. But in a modest way I have always prided myself on having an eye for an aircraft, be it military or civil. There was one machine in the late twenties, for instance, which particularly impressed me as being an excellent commercial proposition for feederline work in the Colonies. Furthermore, it was evidently well suited for ambulance duties and joy-riding."

"Er—yes, sir," Pilkington managed to utter as he edged circumspectly doorwards. "What was that, sir?"

"That," announced the sage with conviction, "was the Canberra."

He turned to expound the virtues of this paragon, but the swing doors clumped heavily. Pilkington had vanished.

* * *

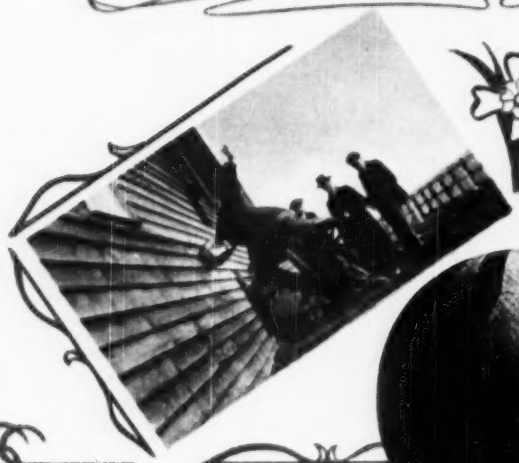
Only the ticking of the clock could be heard in the snug little bar, and the doctor was reproaching himself for having, as he supposed, bored the young man with his musty reminiscences on Christmas Eve. But was *no one* in these days interested in the aircraft of yesteryear—the good and the bad, the great ones and the failures? What had he been speaking of that evening? First, he remembered, the Vickers Vampire ground-attack fighter of 1918, a development of the Vickers F.B.26, and from which the Vickers Venom fighter monoplane was directly descended. Then the Dove—the little Sopwith Dove two-seater; the big Cork flying-boat, built by English Electric; the Avro Spider, Sopwith Snail and Austin Ball fighters (the Snail with a monocoque fuselage); and the Wolseley Python engine of 150 h.p. Then, of course, the Boulton Paul Bugle bomber, and the Vickers Viking and Saunders-Roe Cutty Sark and Cloud amphibians. Next, the three-engined Airspeed Ferry, and last, the de Havilland Canberra (D.H.61), supplied to Australia.

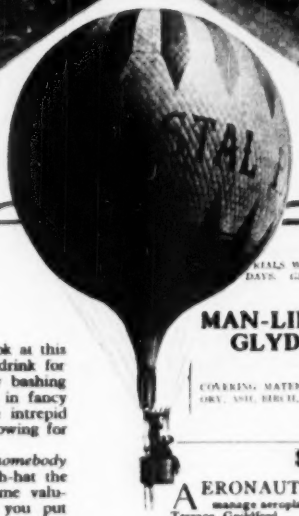
He emptied his glass, girded himself against the cold, and walked dispiritedly out into the darkness. If youth but knew. . .

H. F. K.

[And any reader who is still not convinced may turn to p. 600 where he will find the aircraft envisaged respectively by Dr. Longbottom and Reginald Pilkington faithfully portrayed.—Ed.]

FLIGHT WITH FATHER





NOW that you have divested yourself of your g-suit, your parachute and your oxygen mask, my son, be so kind as to scrutinize these two pages from my scrap-book.

Gladly, Pop. But surely you don't expect me to take them seriously? I mean, look at this character being catapult-launched, into the drink for a cert . . . and this other type apparently bashing his head against a wall . . . and the gang in fancy dress. . . . One admits, of course, that the intrepid aviatrix on the right isn't a bad looker, allowing for the hair-do of the day.

Well, old chap, have your fun. But *somebody* had to fly the first seaplanes; and the crash-hat the fellow is demonstrating probably saved some valuable heads; and one of the gang in, as you put it, "fancy dress" is Henry Farman and another, with the muffler, is the great Louis Paulhan. Anyway, that atrocious duffle coat you wear in your car will look just as odd as these in forty years' time. But we did *live* in those days, instead of merely queueing-up to exist in a state of suspended animation. Look at this balloon-ascent picture, for instance. Can't you feel the "grace of living" in the scene? There was leisure, and dignity, in those days, my boy, and we took pleasure in the simple things. Yes, yes, I know all about the farm labourers who kept their families on ten shillings a week. Perhaps I'm just an old reactionary . . . but *that*, in the picture, is my idea of public enjoyment . . . and you can keep your air-display crowds, licking ice-cream, listening to some facetious ass blaring over a loud speaker, and hoping for an accident ——

But, Pop, those people in your picture were probably only hoping to see the balloonist strangle himself with his rip-cord, or whatever they did in their dicier moments. And, anyway, what was aviation in those days? Just a rich man's sport, like owning racehorses, and drinking champagne out of Gaiety Girls' slippers ——

My boy, if those fellows hadn't started flying when they did, hadn't trusted themselves to wood and wire and 40 horse-power, you wouldn't have flown to Paris by Viking last year for your honeymoon, or be doing your present job. I admit, of course, that aircraft have less peaceful uses ——

Well, we've got *your* generation to thank for that.

Maybe, maybe. But you remember the snap you showed me the other day of yourself standing by that new delta-wing thing, or whatever you call it? Well, you'd better not show it to your Jeremy when he comes back from a moon trip in 1975, or if you do you mustn't expect him to take it any more seriously than you're taking these. See what I mean?

R. E. C.

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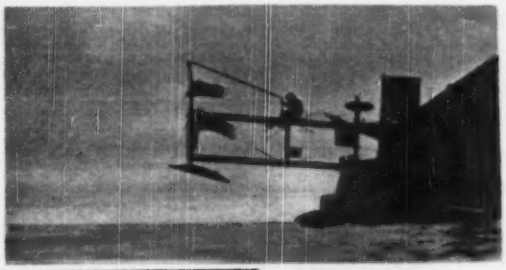

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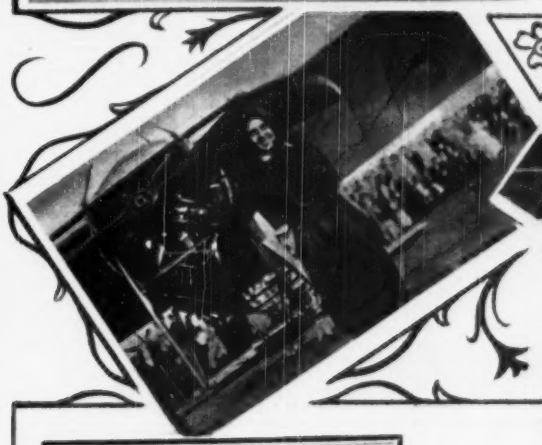

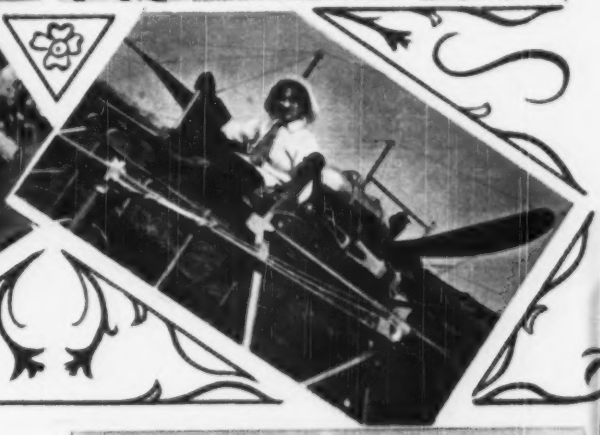

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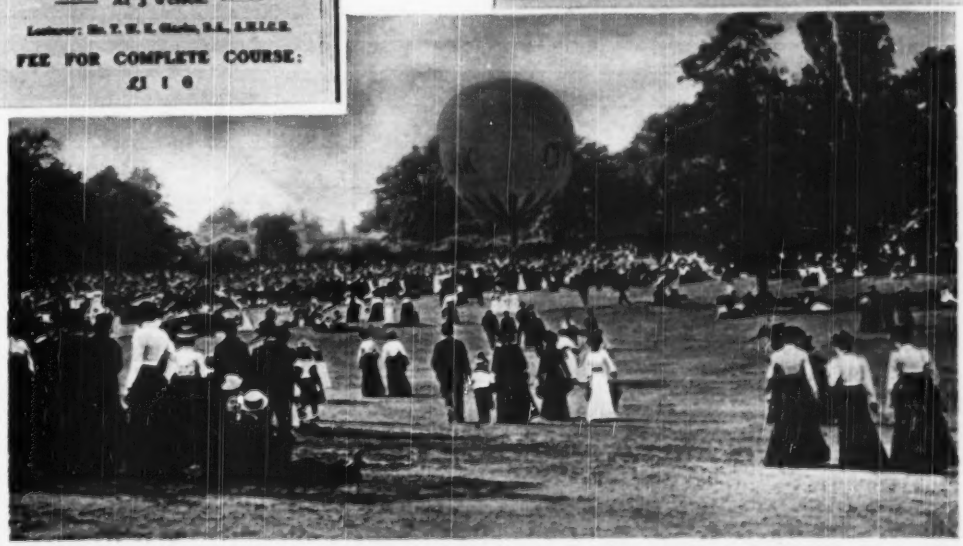
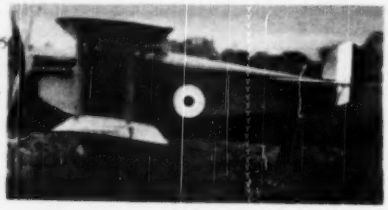


Austin Ball.

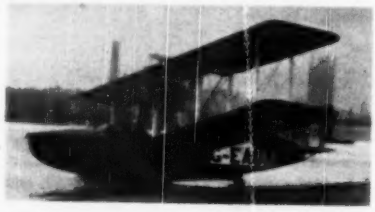
Vickers Vampire.

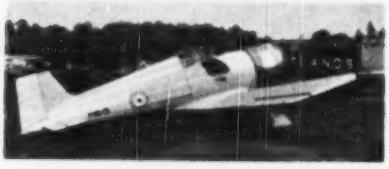


DON'T LOOK NOW...

unless you have read, on page 597, how the machines here depicted were the ruination of a certain young man's Christmas Eve.

de Havilland Vampire.

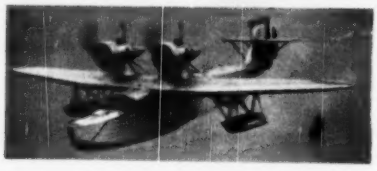




Vickers Viking amphibian.

Vickers Venom.

Saunders-Roe Cutty Sark.



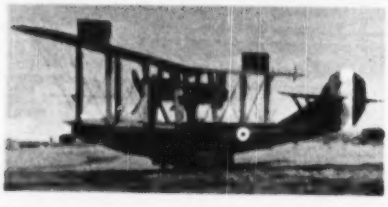
Saunders-Roe Cloud.

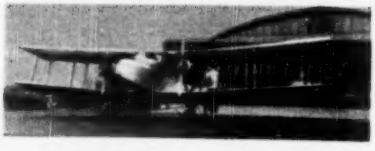
de Havilland Venom.

Airspeed Ferry.

Sopwith Dove.

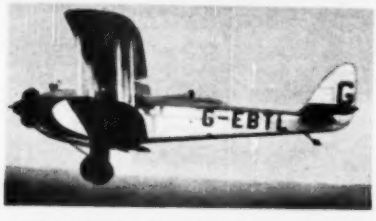
English Electric Cork.





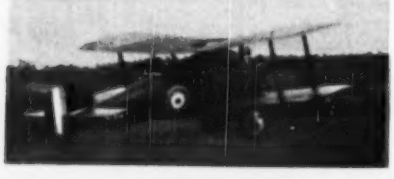
Boulton Paul Bugle.

Avro Spider.



D.H.61 Canberra.

Sopwith Snail.



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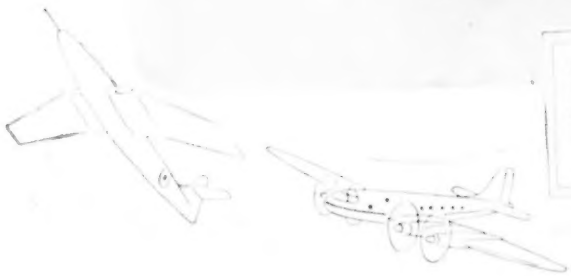

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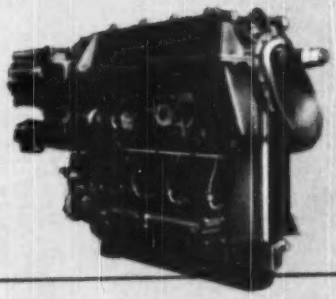
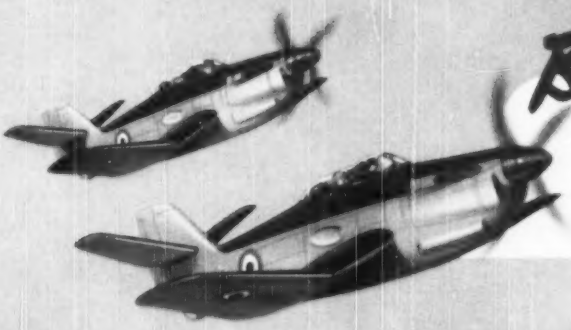
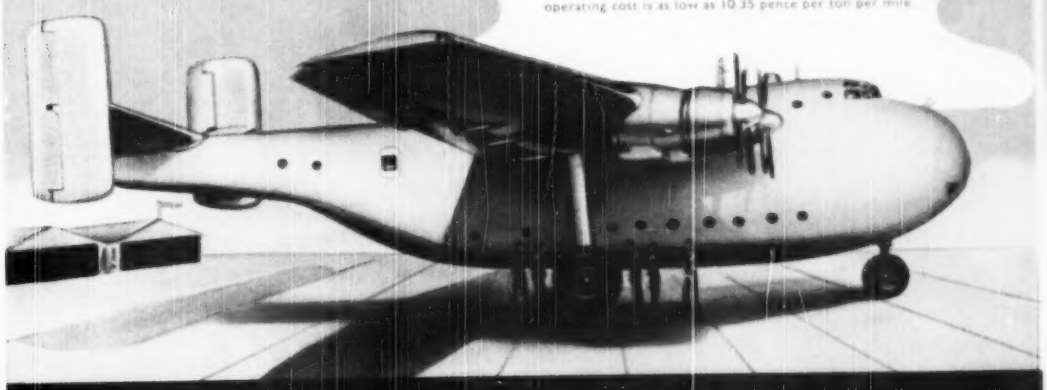


Big— return of power in relation to weight is a main feature of the 180 h.p. Cirrus Bombardier. This direct petrol injection power unit is being widely specified by the Service and Civil Technician alike.



Bigger— potential striking power is provided for the Royal Navy by the Y.A.5 anti-submarine aircraft. This versatile, heavily armed machine which is powered by a Rolls-Royce Griffon Piston engine or Armstrong Siddeley Double Mamba Turbo-Prop Unit, has an exceptional operational performance.

Biggest— payload of all contemporary British civil aviation projects—15 tons—is possessed by the Universal Freighter. This economical all-weather aircraft needs only 585 yards for take-off and cruises at 175 m.p.h. The total direct operating cost is as low as 10.35 pence per ton per mile.



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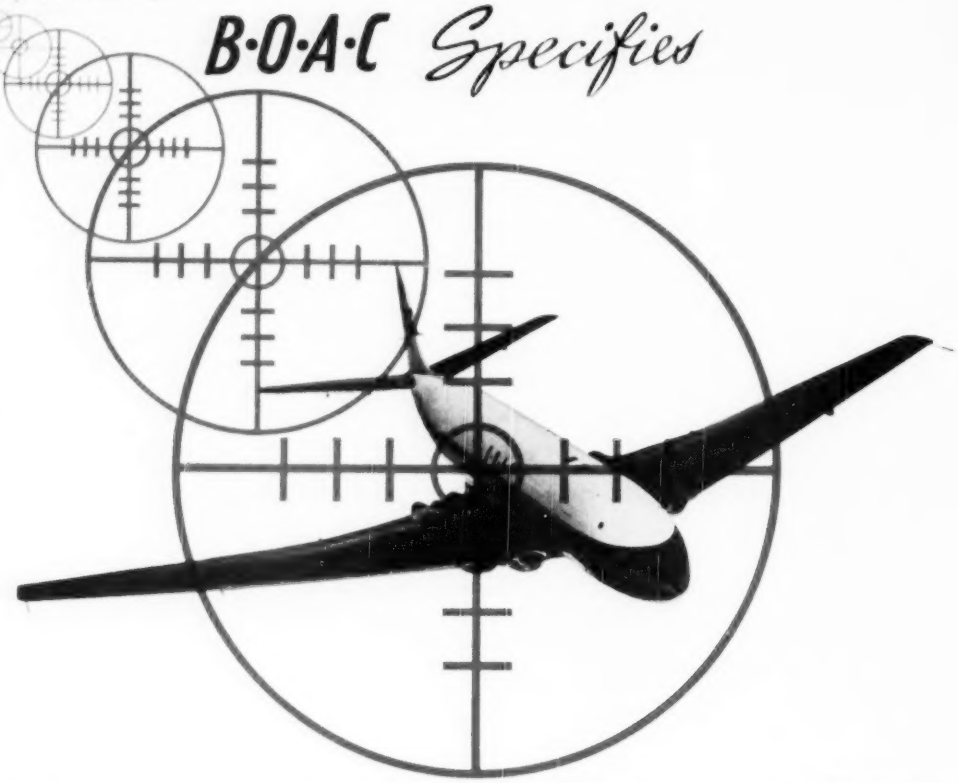

The de Havilland Comets which will shortly be flying in the service of the British Overseas Airways Corporation will be equipped with the Sperry Zero Reader. This great advance in the simplification of instrument flight has a special appeal to airlines whose reputation relies on punctual and reliable operation even under adverse weather conditions.

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JURBY

R.A.F. Aircrew-cadet Training School in the Isle of Man

(Illustrated with "Flight" photographs)

ALL the R.A.F.'s prospective pilots and navigators (other than cadets trained at Cranwell for permanent commissions) undergo 18 months training, evenly broken into three six-month periods. Basic and applied flying are taught in the second and third periods; the first six months are completely devoted to study—academic and technical—and training calculated to discover and develop cadets' powers of leadership and initiative. Some aspects of this preliminary background to flying-training are shown in the accompanying photographs—taken at No. 1 Initial Training School, which is situated at Jurby, Isle of Man.

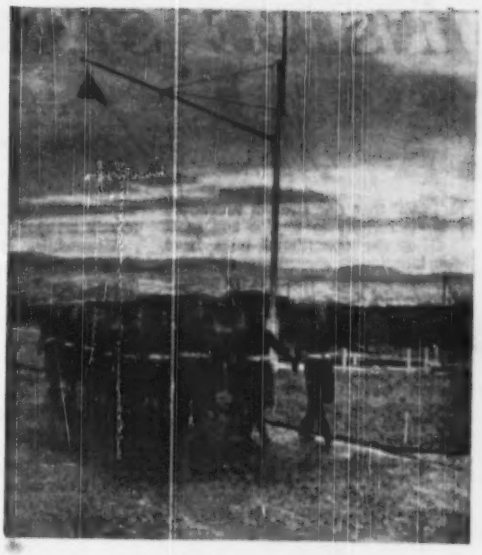
Jurby was until recently the only unit of its kind. Its annual output of 1,600 cadet-pilots and cadet-navigators is insufficient to meet the demand for aircrew created by the expanded Defence Budget, however, and other schools have been formed.

The increased need for aircrews has not caused any lowering of R.A.F. standards; since No. 1 I.T.S. was formed last Easter, 20 per cent of cadets under training there have failed to "make the grade" and have been suspended. Such statistics imply no discredit to the powers of the R.A.F. selection board, as the majority of suspended cadets were in the "lower bracket" of the board's acceptances; many were exceptionally keen pupils but unable to reach the high academic standards required, particularly in mathematics. Good response to the opportunities now offered by the R.A.F. (pay and prospects have recently been much improved) will, it is hoped, attract more candidates of higher quality and reduce the wastage-rate.

Under the latest training arrangements (effective from December 1st), trainees will spend 24 weeks at Jurby (and similar units) as cadet-pilots or navigators. Successful completion of the course automatically results in promotion to the rank of acting pilot officer on probation, and the probationary period continues until the end of flying training. Practically all future pilots and navigators will, therefore, be commissioned.

Cadets now under training, however, undergo an 18-week course and become officer-cadets after 12 weeks. Their commissions are awarded before the end of their flying-training (at the "wings" stage) so that no serious anomalies will arise from simultaneous operation of the two systems.

Training at Jurby, which is commanded by G/C. J. N. Jefferson, covers a wide range of subjects, with an accent on outdoor sport, drill, P.T. and leadership exercises—all helping to produce a spirit of adventure. The technical syllabus is aimed at providing the necessary background for practical airmen—navigation, meteorology, aerodynamics, radio and kindred subjects. Mathematics and physics go beyond school-certificate stage and particular importance is placed on two academic subjects—English and Commonwealth studies.

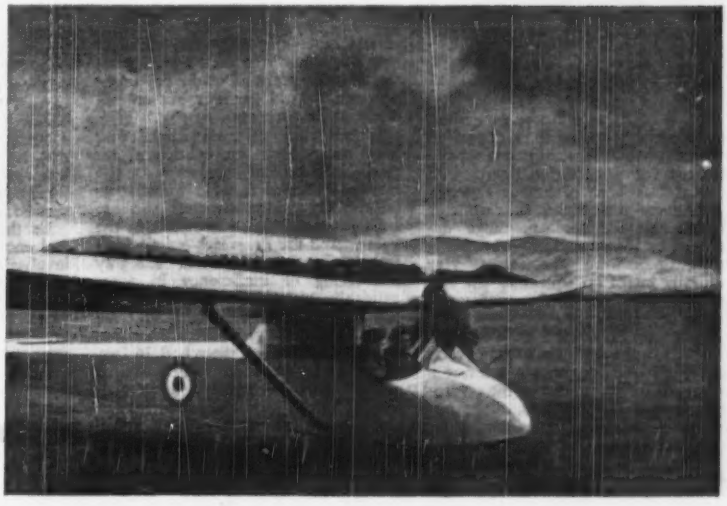


(Above) The parade-ground at Jurby: squad-drill against a background of snow-covered mountains. The heights are frequently explored by cadets on "initiative" exercises.

(Right) The assault course: another aspect of outdoor training at Jurby. Other activities include camping, mountain treks, intensive sport and—in the summer—sailing and fishing.

(Above) G/C. J. N. Jefferson, Commanding Officer of the School.

(Right) Gliding instruction, in two-seat Sedbergh trainers, is given to a limited number of cadets on an "experimental" basis. Only the fundamentals are taught.



F1

INSIDE STORY

By DIOGENES

A Previously Unpublished Chapter in the History of an Airliner's Development : Providence Confounds the Slide-rule

NOW that the aircraft concerned is happily in service and most of the operational bugs have been laboriously chased out of it, the story can be told. There is no powerful moral in the tale—unless it is that plain luck in this business of aircraft design is more usual than is generally inferred from the comments of people reading papers before the Royal Aeronautical Society—but those whose No. 8 hats do not sit too tightly on their brows may find cause for a titter. They may even recognize one or two of their friends—but *never*, of course, themselves.

You see, the design team just couldn't get the fore-and-aft control of the thing into a state of comfortable compromise. When the stability characteristics over an acceptable c.g. range were good, the stick forces were so great and varied so much that Samsons were needed to fly and to land it; and when the tab-gearing and the trailing-edge contours were arranged to lighten the elevator, the aircraft was unstable at aft loadings.

"Samsons were needed to fly . . . it."

Not that it was difficult, dangerous or appreciably worse than dozens of other aircraft in service; it was merely that the Air Registration Board, with a toughness born of higher expectations, were disinclined to certificate the aircraft for the c.g. range demanded by the customers—who, being an airline, were themselves very naturally intent on squeezing the last drop of blood from the contractual pound of flesh.

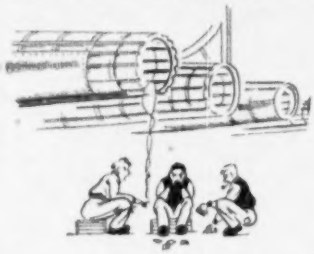
Stalemate had been reached and everyone in the firm was getting pretty bad-tempered. Not to put too fine a point on the matter, the aerodynamicists, project office, flight observers and pilots were hardly on speaking terms. For weeks all communication between the different departments had been by means of tersely composed memoranda.

Meanwhile, had he not been a chess-playing teetotaller with a subsidiary passion for bee-keeping, the production manager would have taken to drink. Rows of perfectly good aircraft stood in the shops with their empennages in various states of dishabille and men were on waiting time for reasons which they understood only in the vaguest terms. To them it appeared idiotic to have production lines waiting while the prototype seemed to fly with remarkable reliability day after day and for no very obvious purpose; not even the shop stewards, flushed with victory from a joint production-committee meeting, could tell them clearly why everything had thus stopped dead. The ordinary management had long since been defeated by the hieroglyphics of the wrangiers and the matter had entered a realm in which even the technical director sometimes found himself floundering. Not the most free translation by the public relations department for the works notice-boards could have made much sense of the odd "stick-free stabilities," "B 2s," "Desyn readings" and "hinge moments" which filled the coldly tempestuous memoranda.

There was no reason why the impasse (if a daily changing succession of modifications, engineered by the person whose theories happened at the moment to be popular, can be described as an "impasse") should not have continued for ever. Or, at least, until the Ministry of Supply, goaded by the impatient airline operator, should enter the ring and, with the help of boffins from their own departments, Boscombe Down, or Farnborough, should hammer out an uncomfortable decision.

Indeed, the pressure might first have come from the politicians, for these unfortunates are ever at the mercy of knowledgeable questioners on the Opposition benches and are curiously sensitive to criticisms in the Press. And the Press was quietly feeling its way towards an almighty uncovering of inefficiency in aeronautically high places, using this unfortunate aircraft as a scapegoat. Bad news being good news from the circulation point of view, there had, in fact, already been some not-so-veiled references to "delays in the production of one of our leading airliners," and one of the more vigorously critical air correspondents had strung together a lot of unrelated misfortunes in order to prove that the British aircraft industry was in control of a set of moronic fellow-travellers.

Nevertheless—it might be added parenthetically—none of the technicians responsible for the impasse appeared to have noticed the rising wind or to feel in any way exposed. They continued to work quietly away in their warm little worlds of theory and were conscious neither of contracual dates nor of the passage of time. Only the upper crust



". . . and men were on waiting time . . ."

of the management feared the icy fury of the gale, and only the business manager ticked off the days as time moved on towards the promised delivery date.

As it happened, it was the chief designer who finally took matters into his own hands. For some time his staff had noticed a gradual change in his manner. Clever and experienced, but mild and almost diffident in his dealings with the rest of the design team, he had taken unexpectedly to the habit of making snap decisions. At first over little, unimportant matters, then over graver issues. In the senior staff mess the story went round that he had been reading *No Highway* and, identifying himself unhappily with the central character (who, you will remember, is a pleasant, but over-boffinized scientist), had decided to base his external behaviour rather on that of the humanely Napoleonic chief designer in that book.

Be that as it may, the change was real enough, whatever the inner effort involved in maintaining a façade which was not at all in keeping with a natural character developed over forty-odd years. He strode vigorously through the drawing-office—whereas he had previously shown a healthy respect for the domain of the chief draughtsman. He argued verbally with the chief aerodynamicist—whereas he had previously dealt only in memoranda and had avoided him when contrary decisions were to be made. He even told

the chief test pilot to provide facts and not opinions in his test reports and made a habit of flying whenever a basic change had been incorporated in the empennage set-up—and this in spite of the fact that the test pilots unconsciously did their best to increase their prestige by making the ride as uncomfortable as possible.

The crucial decision was made quite suddenly. The chief designer had been reading a test report in which the findings were strangely familiar and had sent for the aerodynamicist and the experimental manager. It appeared that elevator development had gone full circle and that the configuration then being tested was exactly that which had been tried with only limited success about three months previously—the configuration, in fact, on which the production drawings had already been based. He sent for the chief draughtsman and the production manager.

Within three hours the discarded initial-production tailplane and elevator were being assembled on the first production aircraft and the riveting guns were chattering again on the work in the various empennage jigs. Four days later the aircraft was wheeled out for engine runs. Working overnight, the inspectors passed it for flight thirty-six hours afterwards. The test crew had never started work so early in the morning; the chief designer was to have flown with them but they were airborne before he had reached his office. Not that it mattered; the first flight would not have told him much and there were a hundred-and-one things to be checked in a new aircraft before any kind of start could be made on serious elevator assessment.

However, the initial findings were promising. At normal loadings there was a change for the better in the characteristics and, as the test work proceeded, hopes rose. Several changes were made in the tab-gearing ratios and one to the ratio between the elevator's up and down angles; but these were, so to speak, merely gilding the lily. The thing was miraculously

"*strode vigorously through the drawing office.*"

right; there was a very decent degree of stability at loadings more aft than had ever been attempted before, and with the c.g. at the forward "paper" limit there was ample control, with only moderate stick forces, in the most extreme landing conditions.

To cut a long story short, the first production aircraft was delivered, with a full Certificate of Airworthiness, a whole week before the contractual deadline.

Now the curious thing is that very few people in the firm—except those directly concerned with control development—seemed to consider the result to be in any way remarkable. Maybe they took it for granted that the test team and the A.R.B. had previously

"*. . . as uncomfortable as possible.*"

been too fussy, or they had learnt to accept without inner comment the idiosyncracies of flying machines. Nobody outside the little group directly concerned asked just why the production aircraft, with the same old discarded elevator set-up, should so miraculously have got over its stability troubles.

It was the public relations manager—a serious chap with a superficially cynical manner, but a passion for collecting all the facts before bursting into print or words—who told me all about it when the story could no longer make news.

There had simply been a mistake in the drawings. Whereas the prototype's tailplane and elevator had been hand-made from the original project-office drawings, the first production aircraft's empennage had been made in the assembly jigs from the production drawings—and these, it transpired, differed in at least one vital particular. Following some indication of fatigue trouble, a certain amount of minor interim redesign work had been carried out on the elevator hinge-brackets, and when the production general-arrangement drawings were finalized the hinge line had moved quite appreciably further aft.

So the elevator had been accidentally given, in small measure, something for which the chief test pilot had always been clamouring—back-set hinges. With this fractionally increased "built-in" aerodynamic balance for the elevator, the differentially geared tabs, when the ratio had been duly readjusted on the early production test flights, had a less impossibly wide variety of conditions with which to cope. No doubt, too, the inevitable differences between the prototype and production trailing-edge contours had, for once, gone the right way, and later measurements showed the tailplane incidence to be slightly more negative than in the original design. Such variations are normal in aircraft manufacture and may have had some bearing on the total improvement—but undoubtedly the cumulative drawing error did the trick.

I doubt if the draughtsman responsible knows of his error. Certainly, nobody gave him a packet of cigarettes for saving the situation—but, on the other hand, nobody even suggested that he should be given his cards.

"*. . . the draughtsman responsible . . .*"

SIR FRANK MUST LOOK TO HIS LAURELS

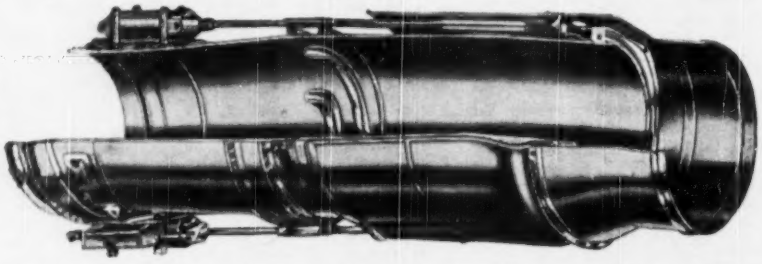
OR so we thought last week when, idly thumbing through a *Flight* Manual of 1910, we were stopped in our tracks, so to speak, by the startling advertisement reproduced here. The unequivocal statement demanded instant investigation, so to the bookshelves we went; and almost before the dust had settled we were faced—on page 698 of *Flight* for August 27th, 1910—with an anti-climax. It seemed that what Mr. Lamplough and his son had in fact contrived was a sort of four - cylinder, eight - opposed piston swashplate engine of turbine-like proportions. *C'est magnifique* (we reflected, a little sadly) *mais ce n'est pas la turbine à gaz.*

JET-PROPULSION TRILOGY

News from America—An Independently Produced Afterburner and an Auxiliary Turbine : Details from Britain via America—The Beta Rocket Motor

WHEREAS in this country the technique of gas-turbine reheat, or afterburning, is still the subject of development work by the engine manufacturers concerned, in America it has apparently reached a stage at which the design and production of complete units can be entrusted to a specialist firm. Thus an independent concern—the Solar Aircraft Co., of San Diego, California—has developed an afterburner for use with the Westinghouse J-34 turbojet, and the unit has successfully completed a rigid 70-hour qualifying test for acceptance by the U.S. Navy.

As may be seen from the cut-away illustration, the Solar afterburner is a divergent/convergent duct, with a pair of annular channel-section fuel distributors arranged concentrically in the plane of the largest diameter. At the forward end of the unit



This part-sectioned view of the Solar afterburner shows the concentric fuel-distributors and, at the forward end, the actuators for the outlet shutters.

are two actuators (one above and one beneath) from which transmission shafts run rearward to actuate the "eyelid" shutters that vary the area of the outlet orifice. The downstream half of the afterburner is enclosed by a shroud through which cold air can pass to provide some measure of thermal insulation from the enormous temperatures of the re-heated gases, the shroud also having the function of protecting the eyelid shutters from mechanical damage.

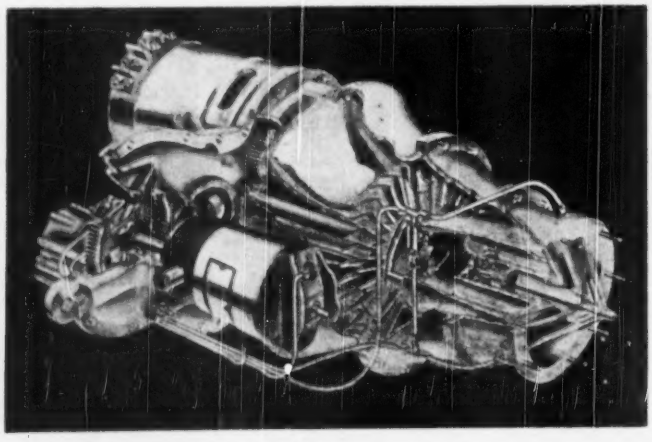
Another "accessory" development recently announced in America is an air and/or hydrogen peroxide turbine auxiliary power-plant for use with high-altitude supersonic missiles. Developed by the Marquardt Aircraft Co., of Van Nuys, California, to meet the hydraulic, electrical and fuel pump requirements of ramjet- and rocket-powered missiles, as well as those of turbojet aircraft, these units are claimed to be less than one-quarter the weight of conventional power-plants of comparable power.

Inasmuch as ramjet and rocket units have no rotating parts, a turbine driven by ram-air pressure is a reasonable choice as a prime mover for driving various auxiliaries. The Marquardt Company is now in production with four different types of these accessory power-plants: (i) a unit for a U.S. Navy missile, which comprises a high-speed ram-air turbine driving two hydraulic pumps and a constant-speed alternator through a reduction gear, and using a hydraulic speed control to maintain r.p.m. within plus or minus 3 per cent; (ii) a unit, for a U.S. Air Force missile, which drives a high-speed alternator direct, and embodies a special electronic governor and throttle to maintain speed within 1½ per cent either way; (iii) a unit for missile application, incorporating a high-speed ram-air turbine, providing direct drive to a large-capacity fuel pump; and (iv) a complete accessory-drive unit designed to operate both from hydrogen peroxide and ram-air. Turbine efficiencies higher than 83 per cent, including gear-box losses, are stated to have been achieved on test in a government laboratory.

No details are available as to the method used in applying hydrogen peroxide as an alternative for driving the turbine in the Marquardt design but, on the other hand, the October 9th issue of our American contemporary, *Aviation Week*, included an article on the Beta rocket motor exhibited on the Ministry of Supply stand at the S.B.A.C. show in September, and gave data on the unit which English journals were not permitted to publish. When the American article was brought to the notice of the Ministry of Supply, the official reply was that the contents of the article could "neither be confirmed nor denied;" we have, therefore, no recourse but to give the information as it appeared in the American journal, whilst accepting no responsibility for its accuracy.

Although designed by the R.A.E., the Beta is built by Faireys, and it is stated that it has already flown. The twin combustion-chambers are mounted one above the other in such a manner that the upper chamber can be tilted to effect pitch control of the aircraft (or missile), whilst the lower chamber can be swung laterally to effect yaw control.

The Beta is a "hot" rocket, in which hydrogen peroxide is used as an oxidiser for an unstated fuel, which might be any one of a large group of hydrocarbons. It is also stated that, as a means of cooling, hydrogen peroxide is circulated through a jacket surrounding the motor combustion chambers and nozzles. Furthermore, a portion of the peroxide flow is diverted to a steam generator to supply power to drive a turbine which, in turn, drives



Interior of the Marquardt auxiliary turbine, showing typical gearbox arrangement for a variety of accessory drives. At the inflow end is seen a cone-type throttle.

Coming into service with the Royal Navy

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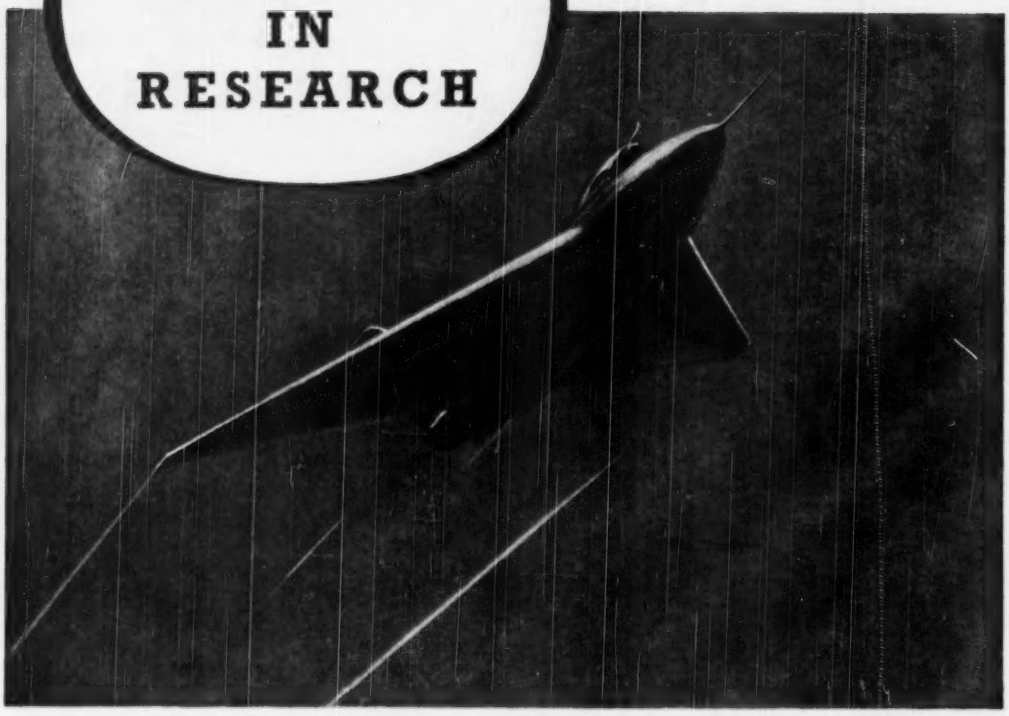

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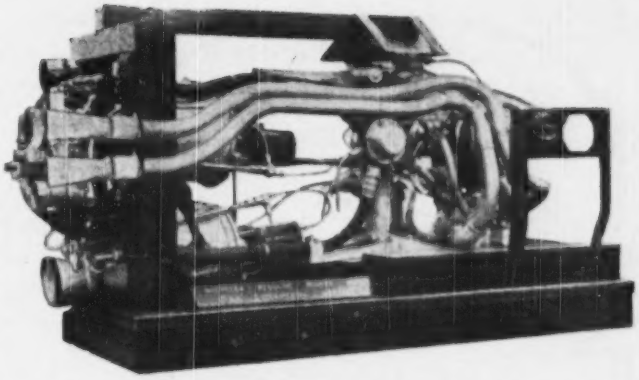


The Fairey-built Beta rocket motor as exhibited at the Farnborough Show.
"Flight" photograph

a fuel pump and an oxidiser pump.

Starting the rocket unit is effected by the application of an external source of pressure—e.g., compressed air—to force some of the peroxide into the steam generator. When the turbine-driven pumps have attained the requisite output, the main propellant valves are opened. A small amount of peroxide is continually supplied to the steam generator to keep the process going.

The photograph illustrates the structural composition of the unit, and the two combustion chambers can be seen one above the other at the left end. The turbine is situated at the opposite end, and the two turbine exhaust-pipes can be seen running back along the unit to discharge through fishtail outlets alongside the upper chamber. The round multi-ported component roughly in the centre is the main peroxide distributing valve; the starting valves are not visible, as they are on the opposite side of the unit. They are stated to be of solenoid-operated type, and are based on German designs; it is also stated that the valves are normally open, so conserving electrical power demand, since continuous application of current is not necessary to hold them open. The main fuel and oxidiser inlets are at the right-hand end, where the octagonal holes can be seen in the auxiliary plate mounted on two supports above the main frame-bed.

Crop-spraying in Canada

Peace-time Work for Lysanders on the Western Prairies

DURING the post-war years, the North American continent has been the main proving-ground for one of the most beneficial uses of aircraft ever devised—the assistance of agriculture by sowing and fertilizing crops and destroying pests. Hundreds of aircraft are to-day being used for such work by scores of operators; methods and applications are being improved almost daily.

The experiences of one small Canadian company, Westland Spraying Service, Ltd., are revealed by its president, Mr. J. R. Morgan, in the September issue of *Canadian Aviation*. This concern operates four war-surplus Westland Lysanders (operator and manufacturer are not connected) and has been at work since 1946. Two more aircraft are being equipped for spraying.

The service is run on lines both businesslike and economical. Farmers sign up in advance for spraying only if weeds or insects appear. They pay nothing until the fields have been sprayed—to their satisfaction. Three teams—each consisting of an aircraft, truck, car and caravan, manned by a pilot, field manager, field marker and truck driver—begin the season's work in the spring on the west-coast side of the U.S.-Canadian border, moving northwards to work on farms to the orders of an agent ahead. The truck carries fuel and spares for the aircraft and the chemicals to be sprayed; supplies are replenished from the nearest bulk-distribution or freight-shipping point.

The crew live in the caravan, and begin work at first light, before the wind has risen. For spraying, which is undertaken at an altitude of eight feet and a speed of 140 m.p.h., the Lysanders are equipped with a spray-boom beneath the mainplanes. They can cover 300 acres in 30 min. with one load of liquid, and reloading and refuelling are accomplished in 15 min. The spray from each machine is calibrated annually after a test-flight over the Westland Service's headquarters at High River, when a 200ft line of glass strips is sprayed from various heights and at varying speeds. The number of spray-stains per square inch of glass is then measured and the equipment adjusted, if necessary, accordingly.

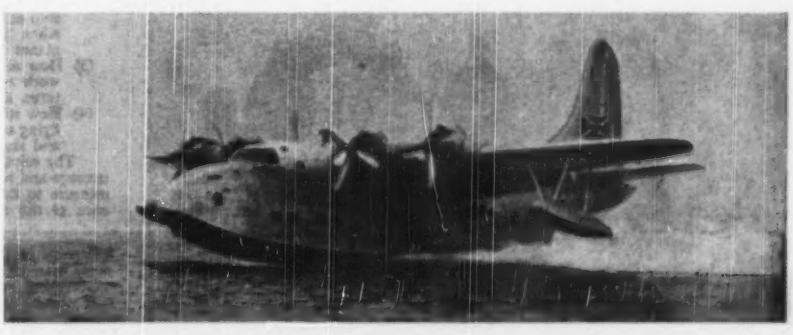
At each farm the field manager makes a chart of the areas to be covered, marking obstructions and portions to be avoided. The pilot makes his spraying runs cross-wind on a line between the truck driver and field marker, who station themselves at opposite sides of the field. The swathe from the aircraft, is 120 feet wide, so the two human target-indicators then pace the interval to a new line (making allowance for a suitable overlap) while the pilot turns for the next run.

Any field of from 100 acres up, says Mr. Morgan, is suitable for spraying, and the work is speeded up—and made more economical—if neighbouring farmers decide to group themselves together.

A new activity for the aircraft is spraying lamp-black, or a similar black substance, on snow-covered fields in the spring. The black surface of the snow then absorbs sufficient heat to melt the top layer, which later freezes to form a thin crust of ice, so preventing evaporation of the snow beneath—and providing an extra four inches of moisture for the growing crop when the earth warms and "drinks-in the melt."

Mr. Morgan quotes one very convincing example of his company's work. Last year it took almost a week for a ground crew of eight men to spray ten miles of trees, on a memorial boulevard near Calgary, overrun with aphides and ants. This year the job was done in a few hours by one aircraft, which made four runs over each row of trees, spraying 3,000 lb of benonite dust and nicotine mixture.

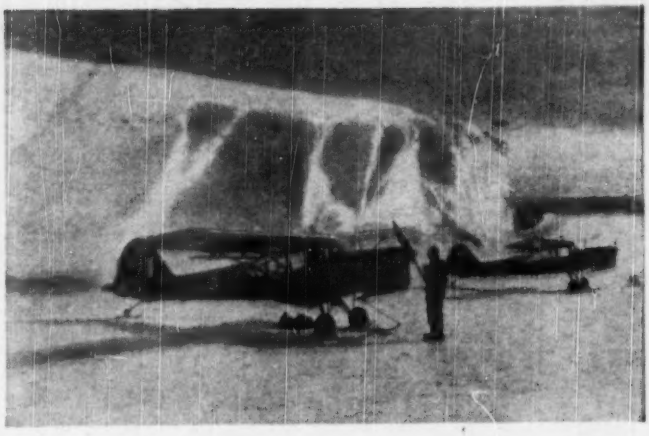
END OF AN ERA



The B.O.A.C.-operated, Short-built, Solent, registered G-AHIO and named "Somerset," is seen alighting on Belfast Lough on November 17th. This was the last B.O.A.C. Solent in service, and on its return to Belfast carried Capt. H. W. C. Alger, lately Manager, B.O.A.C. No. 4 Line, and now in charge of the Princess Flight at Hythe. Also aboard was Mr. J. Lankester-Parker, a director of Short Brothers.

ANTARCTIC AUSTERS

R.A.F. Unit's Part in the Anglo-Scandinavian Expedition : An Account by the C.O.



Sheltered by grimly beautiful ice-cliffs : the two Mk.6 Austers at the Queen Maud Land base.

A YEAR ago a scientific expedition sponsored by the Norwegian, British and Swedish Governments and supported by the Royal Geographical Society, the Scott Polar Research Institute, the Norwegian Polar Institute, and the Swedish Geographical Society, left Europe for a two-year stay in Queen Maud Land, an unexplored tract of the Antarctic, lying between latitudes 20 deg west and 45 deg east.

Part of the British contribution to the expedition was the provision of a detachment of the R.A.F., comprising two officers (S/L. G. B. Walford, and F/L. H. M. H. Tudor, D.F.C.), three non-commissioned officers (Sgt. P. D. Weston, B.E.M., Cpl. L. A. Quar, and Cpl. W. D. Gilbey), and two Auster 6 aircraft. Their function was to provide aerial reconnaissance in the search for a passage through the pack-ice, for a landing place on the Antarctic ice-shelf, and for advance bases on the mainland.

Having satisfactorily completed its work, the flight returned to the United Kingdom last March, as recorded in *Flight* at the time. Cpl. Quar remained behind to act as radio operator for the expedition. The following extracts from notes by S/L. Walford describe conditions and difficulties encountered between the period of departure from London and the eventual departure from Antarctica.

S/L. Walford's Story

Antarctica, the highest, coldest and most remote land in the world, is known to contain the answers to many questions of geographical and scientific concern. Observations over 100 years of the *Arctic* regions have shown that conditions there are getting warmer. The pack-ice is receding and vegetation is growing farther and farther north. An increase in solar activity is believed to be responsible for this change. But what interests the glaciologist is whether this warming-up process covers the whole world, and the logical place to pursue the investigations is in the Antarctic. This is the theme which inspired the planning of the expedition. Glaciology, the study of the movement and behaviour of ice, therefore headed the scientific programme of work, which included geology, survey, physics and meteorology.

The plan was that a party of some fifteen scientists, drawn in equal numbers from the three participating countries, should be deposited in Queen Maud Land, the Norwegian sector of the Antarctic, where they would remain for two and a half years. The vessel which would carry them there would, however, return to Europe at the end of the first season, and sail south again the following year.

No landing had ever been made in this rather inaccessible sector of the Antarctic. Nature does much to deter the visitor, surrounding it with great obstacles. First, the world's most tempestuous ocean must be crossed, next there stretches the unpredictable barrier of pack-ice, and then there remains the insecurity of the continental ice and sudden and violent gales. Pack-ice surrounds the shores even in the short summer season of December to March and its behaviour is so erratic and knowledge of it is so incomplete that it is impossible to forecast when or where penetration may best be attempted.

It was appreciated early in the planning stages that aircraft would be invaluable, if not essential, to the search for a suitable landing place. The expedition received offers from many different quarters for this purpose, but Royal Air Force participation was secured as a result of the great interest of the Chief of the Air Staff; he is, incidentally, a member of the council of the Royal Geographical Society. The R.A.F. Antarctic Flight was formed in the spring of 1949 and we set about the first stage of our adventures—the planning. After examination of various types of aircraft it was agreed that the Auster 6 appeared to satisfy all requirements.

The problem at this stage resolved itself into the following:—

(1) How to get two aircraft, a spare one being essential, on to the deck of a small 600-ton sealing vessel already loaded to the brim with expedition material.

(2) How to protect these aircraft from the effects of 8,000 miles of varying weather and yet be able to operate them from the ship at short notice down south when required either as ski planes or float planes.

(3) How to ensure that they would work reliably in low temperatures, and

(4) How to avoid getting lost when flying over the featureless pack- and shelf-ice.

The solution to these problems of stowage and handling was due in large measure to the ingenuity and persistence of the staff of Auster Aircraft,

The R.A.F. ensign flies for the first time in the Antarctic. The commanding officer, S/L. Walford, is on the extreme left, with Sgt. Weston, F/L. Tudor, Cpl. Quar and Cpl. Gilbey on his right.

ROTOL on the FAIREY 17.
Rotol Eight-Blade Co-Axial Propellers and Accessory Drive Equipment are fitted to the Fairey 17 experimental aircraft powered by the Armstrong Siddeley Double Python Turbojet.
The Fairey 17 is the first aircraft powered by Twin Turbines with Co-Axial Propellers and the first Propelloturbine powered aircraft to land on an aircraft carrier.
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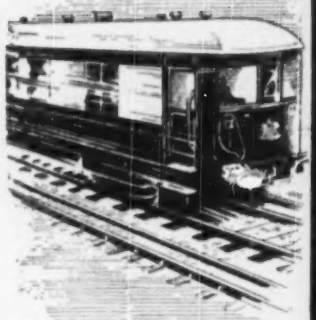

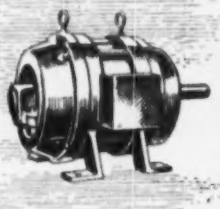

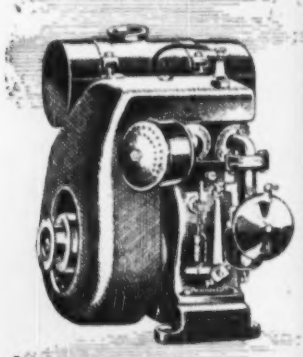

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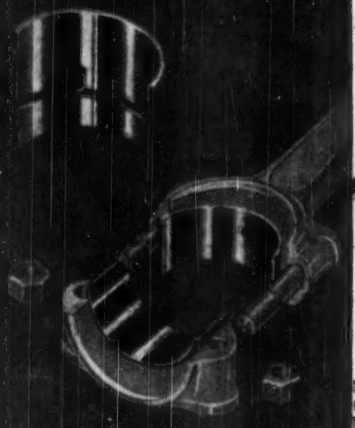

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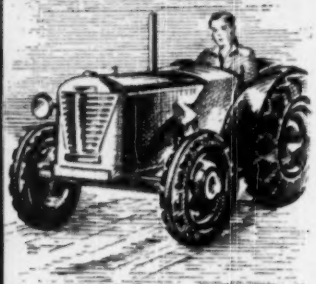
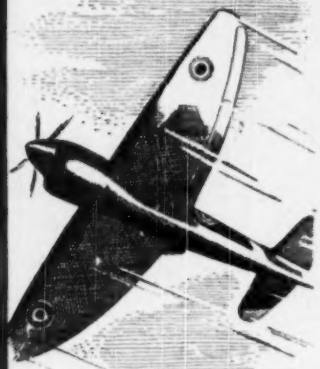
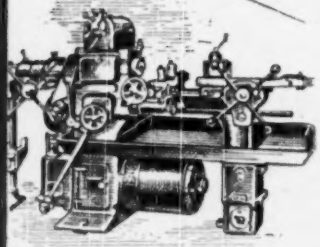






ANTARCTIC AUSTERS . . .

Ltd. An admirable crate designed and produced by the firm housed one aircraft in a partially assembled state, together with all the spares and accessories in specially constructed cupboards. This box acted as a flight office, hangar and workshops at the expedition base. We had obtained ski equipment from Northwest Industries in Canada and from Austers, and at the last moment a float assembly was designed and constructed by the firm in time to reach us before departure.

The expedition ship *Norsel* arrived in London in the middle of November last year and seemed to have no space whatever left for our equipment. But somehow things were sorted out and we found that the large crate stowed athwartships on the afterdeck fitted with inches to spare into the space assigned to it; our smaller crate was fitted in nearby.

The twenty-eight-day passage to Cape Town passed uneventfully, but the sea-water was finding its way into the small crate and doing a certain amount of damage to the aircraft parts secured to the floor.

In Cape Town we realized that we would have to reduce the space we occupied on board and also have to arrange one aircraft in a manner which would enable it to be flown either from the water or the ice at short notice. This meant having to build-up one and expose it to some of the worst weather in the world. We worked hard on the quayside at Cape Town erecting the aircraft from the small crate and hoisting it on board to rest on top of the large crate containing the partially assembled aircraft. With its undercarriage removed it was screwed down and lashed athwartships, protected somewhat by the boat-deck.

Two days after leaving Cape Town the "roaring forties" greeted us with gales and heavy seas. The after-deck which carried the crate was permanently awash in feet of swirling water. Its exit through the scuppers was obstructed by a number of oil barrels, with the result that compression was set up and the floor of the crate began to give way. Thrown from side to side, we worked as best we could inside the crate to repair the damage and reinforce the structure of the crate by means of pit props. The salt water, too, was being literally splashed around both aircraft. For a time the ship proceeded at slow speed, head-on to the seas, and gradually the weather improved.

Rendezvous with an Odour

We now heard that our ship would have to divert to 40 deg west to meet a whale-factory ship, thus adding another 14 days of passage through the "furious fifties." The careful packing and stowage, however, paid good dividends, and by the time we finally reached the ice a fortnight later, no great further damage had been suffered.

Up to this time we had anticipated being able to operate a ski-plane from the pack-ice for our first reconnaissances, and soon after meeting the more stable conditions of the ice we turned the aircraft round into the fore-and-aft position, tipping it up on one wing to clear the funnel. Then, raising it up on the derrick, we secured the Canadian ski-wheel combination and installed the radio.

But the ice this year was going to be difficult. Our first attempts to make headway to the south were frustrated, and it was not long before we were held up, surrounded by tightly compacted floes, unable to move in either direction. The surface of these floes was so rough and heavily hummocked that ski-plane operations were out of the question. In this unhappy position we remained beset for about a week.

It was eventually resolved to try to break out once more into the open sea, there to fly off the float-plane in the search for another route south. Moving slowly out of the ice again we carried the float assembly down from where it had been stowed on the roof of the wheelhouse and placed it alongside the aircraft on top of the crate. Thanks to the skill of Sgt. Weston and Cpl. Gilbey, and the general simplicity of the design, we put everything together in a few hours.

The first suitable stretch of open water that appeared was made use of. With quite unexpected facility I was lowered over the side in VX 127 and was shortly being rowed away from the ship. Once cast off from the pulling boat I primed the engine and fired the starter cartridge. Immediately the engine started and I found myself motoring along at about 10 knots. After five minutes' warming-up I decided that the experiment with the float-plane could no longer be postponed (neither F/L. Tudor nor myself had seaplane or ski-plane experience). Opening the throttle I surged forward in a gathering cloud of spray, and after a series of uncertain movements with the control column found myself airborne after less than a minute. I was both surprised and delighted to find that the aircraft behaved in every way as it should and with great confidence I set off on the first reconnaissance.

All ranks to the assembly of the second aircraft. The N.C.O.s, with hands greased against the cold, did a fine job of work.

The V.H.F. and the Marconi radio compass provided, respectively, excellent communication and navigation, and all the information that I transmitted to Tudor (acting as controller) was recorded on a tape-recording machine. Alighting was very straightforward and the aircraft, hoisted aboard once more, showed no signs of damage or strain.

In the days that followed regular reconnaissances were made in varying conditions of ice and weather. Not always were we able to find good stretches of open water, and on more than one occasion both pilot and spectators wondered how long it would be before that submerged lump of ice finally penetrated the floats.

On February 10th Tudor flew off in miserable conditions of low cloud and snow showers and was able to give us the long-awaited news of a possible ice quayside. Later, in improved weather conditions, he carried the leader of the expedition for closer examination. The site was pronounced fit, the ship was made fast alongside and unloading began.

We now had to transpose VX 127 from floatplane to ski-plane and to build VX 126 up from its partially assembled state in the crate. A mild blizzard prevailed for the two days we took for this work.

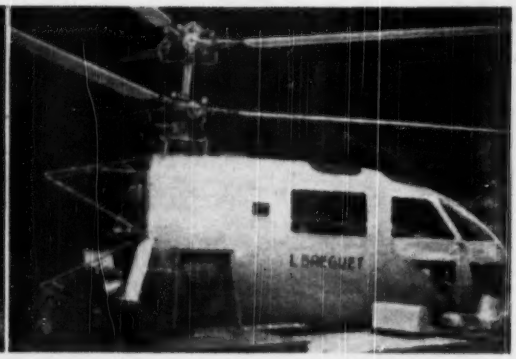
The main components were quite straightforward, but it is not until an aircraft is put together in a polar climate that one curses the invention and necessity of split-pins, locking wire and all the other oddments that go to make the finished article. The N.C.O.s, their hands greased, worked for astonishingly long periods without complaint and without the need to seek shelter and warmth; thus, by the time the weather cleared, we had two serviceable Auster 6 ski-planes parked on the ice "tarmac."

During the next week, while the base was being built, we flew some forty hours, sketching and photographing the coast and crevasses, and sighting, 160 miles away, the nearest and only outcrop of mountain peaks. The members of the wintering party were taken for flights round the area so that they could have some idea of the barren wilderness of ice that would enfold them for the next two and a half years.

The aircraft remained serviceable all this time, in spite of the inevitably rough treatment they had from the hard ripples, or *sastrugi*, in the ice surface. Our landing strip lay about 500 yards to the south of the ship, and to reach it we had to taxi up a slope of about 1 in 10. Without brakes the descent was somewhat hazardous and it was essential to have someone on the wing struts. The ski-plane would become airborne with full load in about 300 yards with a wind of Force 4; with no wind at all the run was very much prolonged. Flying over this shelf ice was quite simple when there was little cloud, but in overcast conditions the cloud merged with the horizon into an indefinite greyness and depth-perception was difficult.

On flights over the sea we repeatedly noticed new ice forming —a danger signal that temperatures were getting much lower and that it was time we left. We had done all we could to assist the wintering party build their home and we had discharged the duties set for the aircraft. With one aircraft re-crated and the other on the fore-deck we set course on February 22nd for South Africa.

I think we had been able to prove once again Scott's dictum that the best equipment is only just good enough for the far South; but we had no complaints, and if required to do a similar job again would not alter our equipment or technique in any way.



Main assemblies of the Bréguet Gyroplane at Villacoublay. The Wasp Junior engine may eventually be superseded by a Turbomeca gas turbine.

FRENCH HELICOPTER PROGRESS

Developments of the S.O.1110 and Co-axial-Rotor Bréguet

FOLLOWING successful trials with the two S.O.1110 Ariel II helicopters, both machines have been returned to the S.N.C.A.S.O. experimental hangar at Villacoublay, and are undergoing minor modifications, such as nosewheel coupling to rudders, and alterations in the rotor head and electrical systems. The first prototype S.O.1100 appeared at the 1946 Paris Salon with a propeller within a circumferential ring and in this form did tethered trials in 1947. Various modifications, such as the fitment of a rear fuselage and reshaped fins and rudders, rendered it necessary to redesignate the type as S.O.1110. A second example flew in April, 1950, and between them the two aircraft have accomplished something over five hours' flying in their present form. While trials on the 1110s are being resumed, the prototype of the three-seat S.O.1120 is nearing completion at Courbevoie, and should fly early in the New Year.

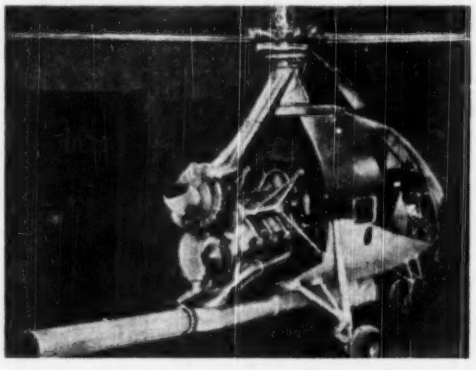
In place of the 200 h.p. Mathis engine on the earlier versions, the 1120 will have the new 220 h.p. Turbomeca Artouste gas turbine, directly driving the feed compressor. The rotor will remain unchanged, but slight alterations have been made to the rotor head, lubrication system and the ignition arrangements. During slow flying or while hovering, directional control will be effected by the reaction of the exhaust gases from the turbine, giving about 45lb thrust.

Rotor diameter naturally remains the same as on the S.O.1110 and other data follow: Operational empty weight, 1,270lb; disposable load, 1,210lb; normal all-up weight, 2,480lb; maximum sea level speed, 109 m.p.h.; cruising speed, 84 m.p.h.; hovering ceiling without ground effect, 2,300ft; hovering ceiling with ground effect, 4,920ft; service ceiling with forward speed, 10,170ft; oblique rate of climb near ground, 1,180ft/min; cruising range, 155 miles.

Another project by S.N.C.A.S.O. is for a "flying crane" helicopter embodying the principles of the earlier types, and able to lift 6,600lb. Other projects exist for helicopters-cum-aeroplanes seating upwards of four passengers.

Specializing in contra-rotating, co-axial-rotor helicopters, the Bréguet firm are continuing development of their Gyroplane G.11E, built at Villacoublay just after the war ended. Originally flown with a 260 h.p. Potez 9E radial, the prototype has been considerably modified and fitted with a 450 h.p. Pratt and Whitney Wasp Junior R-985-SB5. With the new engine the designation of the machine has been changed to Br.III. The fuselage has been lengthened from 30ft 2in to 31ft 9in and the cabin can now accommodate four passengers or a pilot, two stretchers, a doctor and a nurse. Flight tests are expected to be resumed soon at the hands of Fred Nicole; meanwhile the other two prototype G-11Es are lying in a corner of the hangar at Villacoublay, and are not in a flyable condition. Installation of a Turbomeca gas turbine is foreseen.

Data for the new Gyroplane Br.III follow: Rotor diameter, 31.48ft; operational empty weight, 3,248lb; disposable load, 1,380lb; all-up weight, 4,620lb; vertical ceiling without forward speed, 5,200ft; maximum speed near ground, 133 m.p.h.; cruising, speed, 107 m.p.h.; service ceiling with forward speed, 15,000ft; speed range at 6,500ft (at maximum all-up weight), 62 to 130 m.p.h.; range with 408lb fuel, 291 miles; rate of descent in oblique autorotation, 1,279ft/min.



The first S.O.1110 Ariel II being overhauled and slightly modified. This type is an extensively redesigned development of the S.O.1100 of 1946.

R.Ae.S. ASSOCIATE FELLOWSHIPS

THE Royal Aeronautical Society announces the undermentioned names of candidates successful in the Associate Fellowship examination (old syllabus), held last August. Subjects include applied mathematics, aerodynamics, aircraft design, strength of materials and structures, theory of internal-combustion engines, and air survey and photography. Names, in alphabetical order are:—

Candidates in Great Britain.—P. C. Agrawal, P. P. Benham, F/L. G. Bond, A.R.Ae.S., B. Buss, J. A. Caister, P. J. Colbourne, I. J. Davies, R. W. Edwards, P. P. Elliott, E. Fryer, B. M. Goldsmith, F. Gowens, A. W. Gray, E. A. Greenwood, R. N. Hadcock, S. D. Hall, J. T. Hawken, T. H. J. Heffernan, D. H. Hughes, J. H. Hurford, F/L. F. A. Johnson, M. Kishor, R. G. Knight, J. A. Kozlowski, R. H. Ladd, B. Landi, W. W. Lewis, J. M. Lewendon, J. E. Mack, H. J. F. Manners, C. H. Martin, John Nash, D. Naylor, Miss J. M. Nelmes, N. N. Nicholls, A. M. G. Olsen, B. G. Cour-Palais, R. G. Prasad, H. N. Roy, A. J. Salmon, A.R.Ae.S., R. L. Samuels, D. Shellard, L. J. A. Sice, F. M. Soonawalla, G. N. Srivastava, E. Vezyrianidis, D. W. Warne, K. R. Warren, C. R. J. Whitfield, K. F. Wood, J. Wyatt.

Candidates Abroad.—K. C. Duggal, W. E. Hagan, Cpl. W. G. Johnson, R.A.F., Sgt. P. Long, R.A.F., J. L. O'Reilly, C. S. Patro, J. W. Paulsen, K. C. Pradhan, C. Rajagopal, B. Singh, F/Sgt. N. V. Slatter, R.A.F., T. V. Trinder.

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CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

The Professional Pilot

THE leading article in your issue of December 7th is timely. For months now the Association has been pointing out that the time is not far distant when the shortage of pilots will be so acute that there will not be sufficient to man the Corporations, the charter companies and the various flying schools.

The solution to the problem, as we see it, is the same to-day as it was in 1947, when the Association recommended to the Wilcock Committee the introduction of scholarships, tenable at training establishments, for young men interested in making a career in civil aviation. If no such method of securing pilots is introduced the only source of supply is the Royal Air Force and, as you so rightly point out, no one is likely to leave the R.A.F. at the present time for civil aviation.

It seems indisputable that if something is not done—and that right speedily—in a few years' time civil aviation in this country will be a-dying for the want of pilots. The profession is becoming more and more specialized and pilots cannot be produced at short notice.

D. FOLLOWS,
Secretary,
British Air Line Pilots Association.

London, W.1.

Christmas Cigar

DURING a recent cold spell a twin-engined aircraft flew over my house near Bromley, Kent, at a height of approximately 20,000 feet. I could identify little more than that it was twin-engined, either by piston or turbojet.

The point was that, as the aircraft gradually disappeared in a north-easterly direction it assumed the shape of a cigar. The illusion I ascribe to the combined effect of a short, tail-like vapour trail plus the reflection of sunshine on the surface of fuselage and wings.

Not long after this incident, I found this report from a news agency:—

"A mysterious cigar-shaped object was seen flying high over London yesterday. According to one eye-witness, it made a noise 'like two heavy bombers.'

"'I have never seen anything like it before,' said one man. 'There was an intense bright disc of light at what appeared to be the rear of the object, which itself seemed to be silvery.

"'It was flying so high that it was difficult to judge whether it was travelling particularly fast. The bright light could still be seen when the object had flown far away in the distance.'"

Was there any connection between my observation and that reported by the agency? And is it mere coincidence that the crop of "flying saucers" and "cigars" has come upon us at almost the same time as general introduction of jet and other aircraft flying at great heights?

GEORGE G. LOCKHEAD.

Bromley, Kent.

Fighter Armament

MR. WEYL'S excellent articles on fighter armament emphasize the sad (and serious) fact that, while we lead the world in the design of high-speed interceptor aircraft, the weapons we are mounting in these aircraft are obsolete.

Future tactical requirements will call for greater specialization in armament. The versatile, general-purpose fighter developed in the last war must give way to the specialist type, armoured, armed, and powered for each specific rôle. The tactical fighting approach for each rôle will decide such requirements as range, fire-density and calibre of weapons. For the single purpose of home defence, variants of fighter armament will be needed.

Assuming the hostile formations to be composed of a few (possibly not more than two) aircraft carrying the super bomb, surrounded by close-escort defensive bombers, close fighter-screen, and fighter screens at all levels in support, the defending force can concentrate its tactics on penetrating the screen to destroy the vital load-carriers.

Thus fighter defence will call for stricter discipline in the air than heretofore, with each squadron playing its predetermined part. Briefly, the rôles are as follows:—

(1) Decoy units to draw off the fighter screens.

(2) Frontally armoured fighters to break up the formations of close escort bombers.

(3) Heavily armed fighters to make a formation attack, diving through defence formations to the bomb carriers.

(4) "Destroyer" fighters with heavy armament to fire at bomb-carriers from long range, keeping out of danger area of close escort.

Clearly, these four rôles call for special armament in each case:

(1) *Fighter v. fighter.*—High density of fire from shell-guns (not less than four 30 mm, or two of larger calibre).

(2) *Fighter v. aerial "flak" ship.*—Engine and all vital parts heavily armoured against return and cross fire; shell-guns of heavy calibre (50 mm) or rocket salvoes.

(3) *Fighter v. bomber (close range).*—Battery of rockets to fire in ripple salvo (e.g., German "Natter").

(4) *Fighter v bomber (long range).*—Twin-engined fighters with very heavy calibre non-automatic shell-gun (pilot to aim and fire, crew to reload) with shell proximity-fused; or winged supersonic rocket projectiles with automatic target-homing or radio-controlled-aiming by pilot (i.e., aerial battleships).

It is not suggested that special aircraft should be designed for each of these purposes, but that one, or at most two airframes be modified to suit each requirement, and give the aircrews the best possible chance of bringing their weapons to bear with maximum lethal effect. The development of suitable aiming devices must keep pace with development of weapons and aircraft.

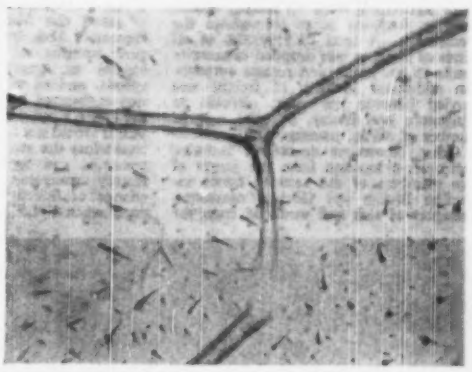
Clearly, Fighter Command will be called upon to carry out many other rôles, such as close support to the army (dive-bombing, rocket firing and skip-bombing), bomber escort, night fighter defence, night intruder, etc. All these may call for further variations in armour, armament and power, not to mention special training of the pilots.

J. C. R. WATERHOUSE,
(F/L., D.F.C., ex-R.A.F.V.R.).

East Horsley,
Surrey.

How Doth the . . . ?

ACCORDING to Darwin's theory of evolution there is no part of any creature which is without a specific purpose. It is, therefore, interesting to speculate on the possible reasons for the spikes which appear on both surfaces of the wings of the honey bee (see accompanying micro-photograph).



Microphotograph portion of a bee's wing, showing the spikes referred to by "Aeroapiarist." The "Canals" are structural blood-vessels.

Perhaps some of our aerodynamicist-entomologists such as Sir Geoffrey de Havilland and Mr. Scott-Hall could cast some light on the subject.

The bee has been flying for some millions of years and so, if experience counts for aught, it should know a good deal about aerofoil design. By some it has been likened to a twin-rotor helicopter with the blades following a figure-of-eight path which, in flight, becomes an itatic curve. It has a most effective device for wing-folding, the hind pair of wings being stowed under the main wings while the insect is at rest. During flight the rear wings are attached to the front wings by means of tiny hooklets. It is thought that the main lift is supplied by the front wings and that the rear wings are used exclusively for directional control and alteration of camber.

AEROAPIARIST.

North Cheam.

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements

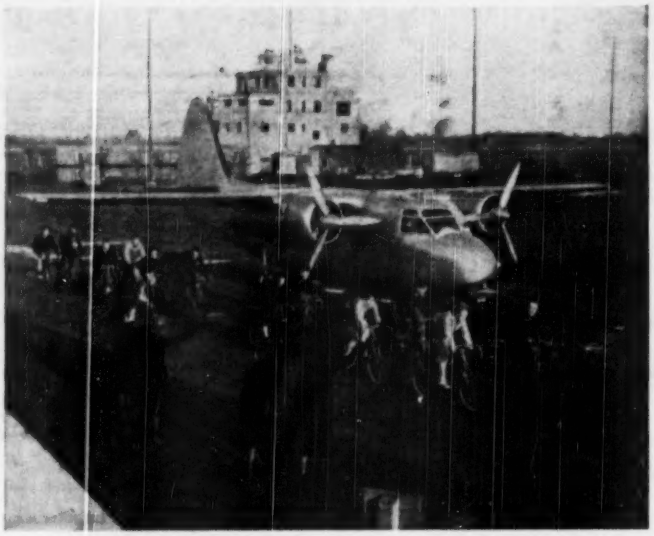
The War in Malaya

DURING November, bad weather made target-identification difficult for the R.A.F., R.A.A.F. and R.N.Z.A.F. aircrews operating against the Malayan terrorists. As a result, activities were slightly reduced—both on offensive strikes and supply drops.

Day and night bomber and fighter strikes took place in six States during the month, with the main effort centred on Negri Sembilan. A record number of sorties was flown on November 14th, when targets were attacked in daylight by Lincolns, Brigands and Tempests in Negri Sembilan, Perak and Pahang. Activity was also intense on November 22nd, when Lincolns, Spitfires, Tempests and Brigands struck bandit concentrations in Negri Sembilan, Selangor and Perak. On November 20th, Lincolns and Brigands made concentrated attacks in Pahang for over an hour on a large bandit gang pursued by security forces.

For the first time for several months Sunderlands contributed to operations. Supply dropping and airlift operations were carried out daily by Dakota squadrons to dropping zones throughout the Federation. A total of 350,000lb of all kinds of supplies was dropped to security forces in the jungle and remote outposts. An additional 11,000lb of freight was carried between the main airfields in Singapore and Malay, as were a large number of official passengers.

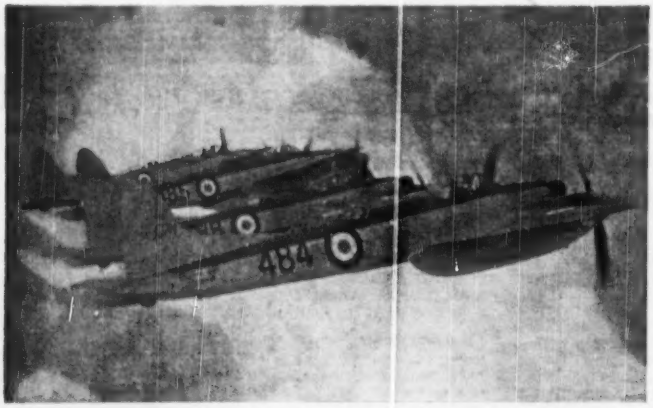
Other November operations included helicopter-evacuation from the jungle of five members of the security forces including British and Gurkha casualties; transport of sick and wounded from the Federation to Service hospitals in Singapore; dropping of over 200,000 leaflets; provision by Brigands of air cover for school children returning from the Cameron Highlands; and photographic and reconnaissance flights.



THE PRINCE AND THE PEDALLERS: Wrens and ratings at Royal Naval Air Station Lee on Solent use the two-mile perimeter track for sprint and distance cycle races. The ship-shape Percival Sea Prince is used for communication flying and training.

In The House

S/L. F. BURDEN (Cos., Gillingham) asked the Minister of Supply, on December 12th, how far the R.A.F. had gone towards solving the problems of control at transonic and supersonic speeds, and to what extent information was exchanged between the R.A.F. and the U.S.A.F. on this subject. Mr. Strauss said it would not be in the public interest to disclose the state of our knowledge of transonic and supersonic flight. Satisfactory arrangements existed for the exchange of information. There was no reply when S/L. Burden asked the Minister if he was not aware that the Americans have for some considerable time been flying faster than sound. There was, he said, very considerable apprehension in this country regarding our own position, and he wished to know why this country should be lagging behind America in this matter. No reply was forthcoming when A. Cdre. Harvey (Cons., Macclesfield) asked the Minister, "Do you realize it would be in the public interest for them to know we have aircraft faster than Russian jet aircraft? Unless you do something, the situation in the future is a very ugly one."



SEEKERS AND LEADERS: The principal roles of the de Havilland Sea Hornet N.F.21, four of which are pictured above, are night fighting and navigating for single-seat strike aircraft.

Christmas in M.E.A.F.

AT all stations in the Middle East Air Force where officers and airmen have their families living with them, children's parties, with visits by Father Christmas, will be the main feature of the Christmas festivities. Although at most Middle East stations Santa Claus will more probably arrive riding on a camel than by any other means, he will conform to tradition at R.A.F. Station, Ismailia, the Headquarters of M.E.A.F., by arriving in a sleigh. At Port Said he will land from a motor launch, with presents for the children of the R.A.F. Embarkation Unit there. He will appear at other Suez Canal Zone stations by way of the chimney, and after his arrival in this way at a big aircraft maintenance unit the children will perform a Nativity play. At some other stations, including the one at Amman, capital of Jordan, he will arrive by air, and at Kabrit, in the Canal Zone, he will descend by parachute.

Outdoor events will include a ceremonial meet of the only R.A.F. Hunt in the Service—the Royal Exodus—at Habbaniya, Iraq; a comic three-sided soccer match played with a Rugby ball, at El Firdan, in the Canal Zone; and a fancy dress football match against the Royal Navy at Basra, in the Persian Gulf. Indoors there will be bar and billet decoration competitions, dances and entertainments.

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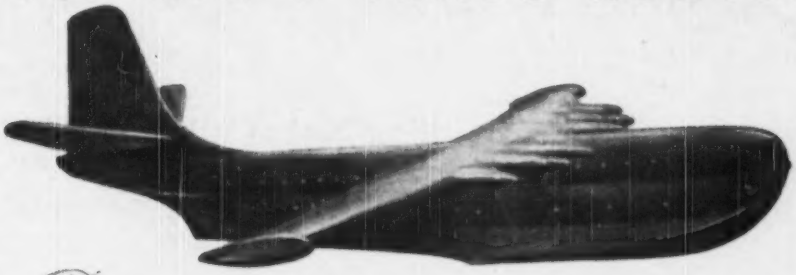

The Princess

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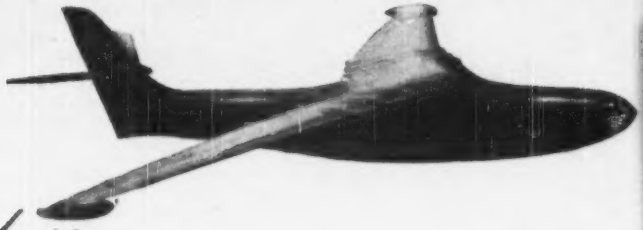

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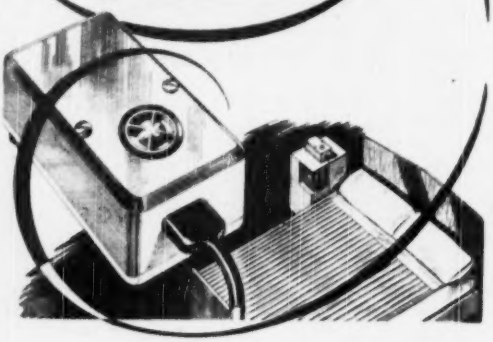

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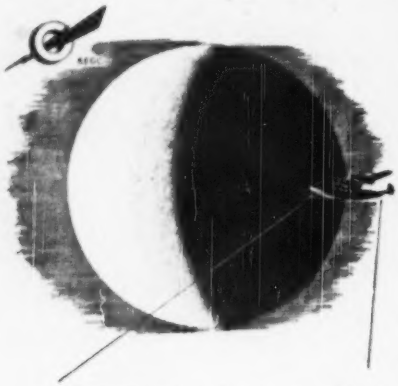

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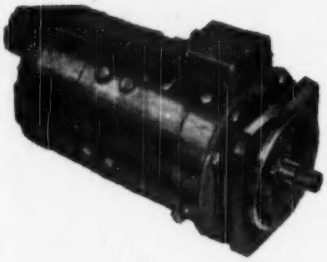

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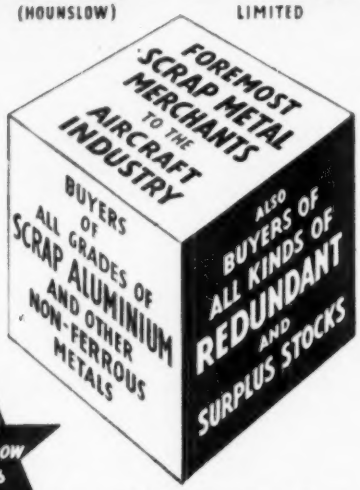
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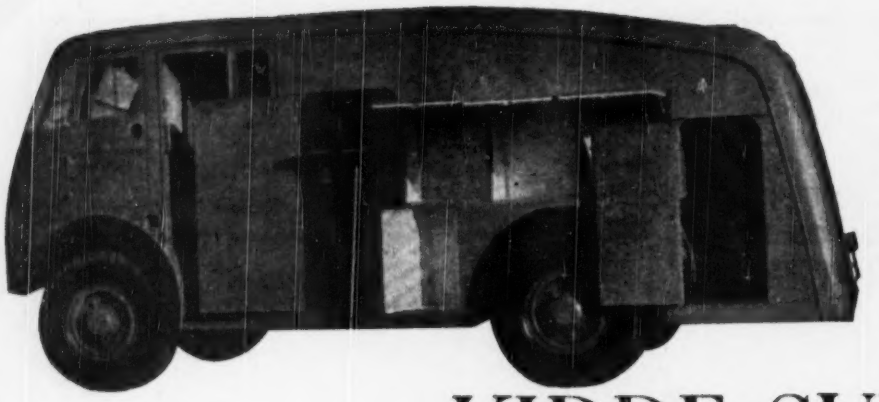

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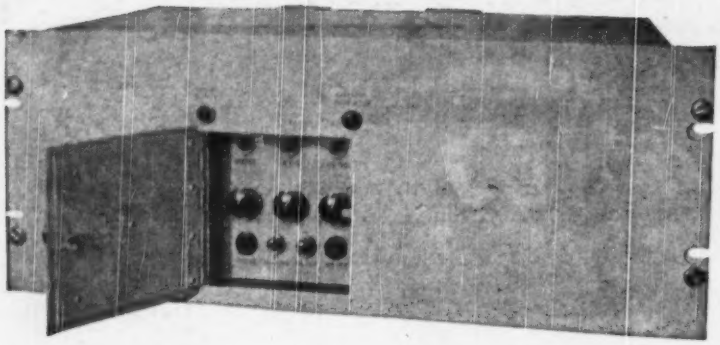

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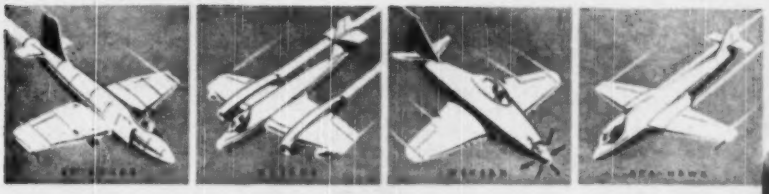

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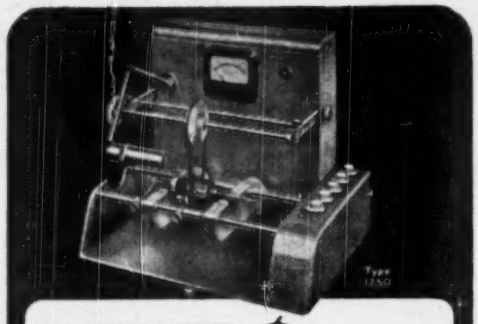

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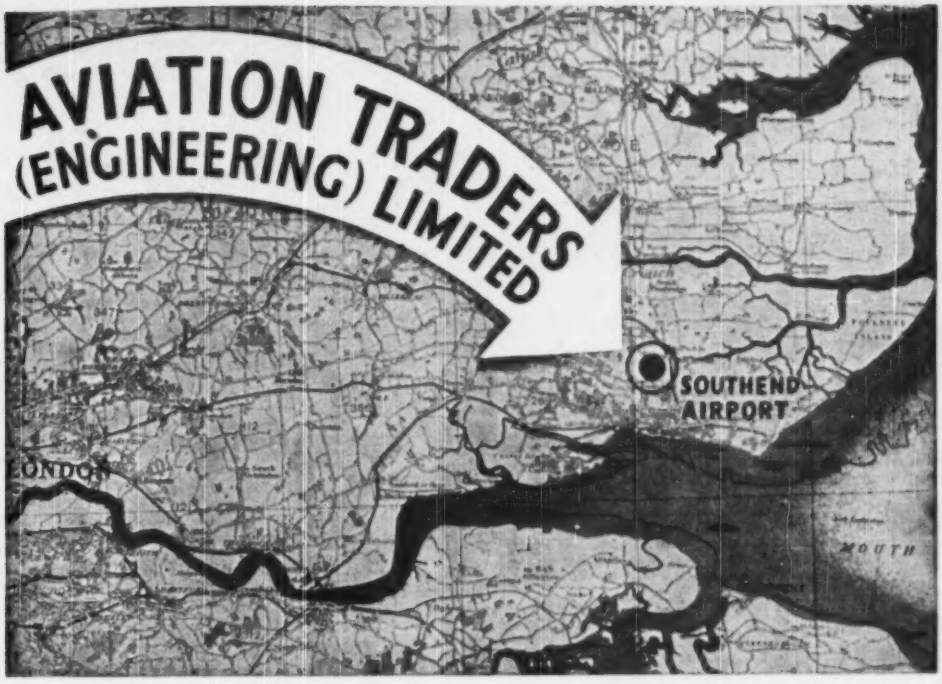

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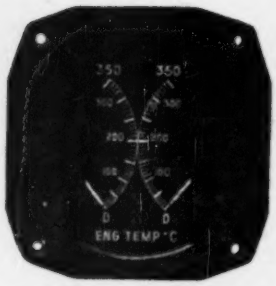

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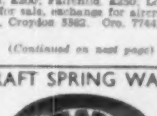

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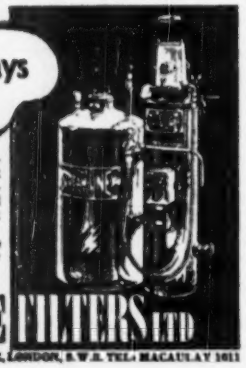

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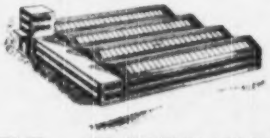

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